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FIG. 1.—Small aneurism of the aorta ruptured into the esophagus—the rupture consisting of a linear slit, 1.5 cm. in extent, with clean cut margins.

INTERNATIONAL CLINICS

A QUARTERLY

OF

ILLUSTRATED CLINICAL LECTURES AND ESPECIALLY PREPARED ORIGINAL ARTICLES

ON

TREATMENT, MEDICINE, SURGERY, NEUROLOGY, PEDIATRICS, OBSTETRICS, GYNECOLOGY, ORTHOPEDICS, PATHOLOGY, DERMATOLOGY, OPHTHALMOLOGY, OTOLOGY, RHINOLOGY, LARYNGOLOGY, HYGIENE, AND OTHER TOPICS OF INTEREST TO STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION THROUGHOUT THE WORLD

EDITED BY

A. O. J. KELLY, A.M., M.D., PHILADELPHIA, U.S.A.

WITH THE COLLABORATION OF

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JOHN H. MUSSER, M.D. — PHILADELPHIA
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VOLUME I. THIRTEENTH SERIES, 1903

PHILADELPHIA

J. B. LIPPINCOTT COMPANY

1903

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CONTRIBUTORS TO VOLUME I

(THIRTEENTH SERIES)

BALLANTYNE, J. W., M.D., F.R.C.P.E., F.R.S. (Edin.), Lecturer on Midwifery and Diseases of Women, Medical College for Women, and Examiner in Midwifery in the University, Edinburgh, Scotland.

BILLINGS, FRANK, M.D., Professor of Medicine in the Rush Medical College (in Affiliation with the University of Chicago), Chicago, Illinois.

CATTELL, HENRY W., A.M., M.D., Philadelphia.

EINHORN, MAX, M.D., Professor of Medicine in the New York Post-Graduate Medical School; Visiting Physician to the German Dispensary, New York City, etc.

FINGER, ERNST, M.D., Extraordinary Professor of Dermatology and Syphilis in the University of Vienna.

FUSSELL, M. HOWARD, M.D., Assistant Professor of Medicine, University of Pennsylvania; Physician to St. Timothy's and St. Mary's Hospitals, Philadelphia.

JONNESCO, THOMAS, M.D., Professor of Surgery and Director of the Surgical Clinic in the University of Bucharest, Roumania.

KEEN, WILLIAM W., M.D., LL.D., F.R.C.S. Eng. (Hon.), Professor of the Principles and Practice of Surgery, and of Clinical Surgery, in the Jefferson Medical College, Philadelphia; President of the Congress of American Physicians and Surgeons, etc.

KING, A. F. A., Professor of Obstetrics and Gynecology in the Columbian University, Washington, D. C., and in the University of Vermont.

MANLEY, THOMAS H., PH.D., M.D., Visiting Surgeon to the Harlem Hospital, and Professor of Surgery in the New York School of Clinical Medicine.

OSLER, WILLIAM, M.D., Professor of Medicine, Johns Hopkins University; Physician-in-Chief, Johns Hopkins Hospital, Baltimore.

Ross, George G., M.D., Surgeon to the Germantown Hospital, and Assistant Surgeon to the German Hospital, Philadelphia.

Satterthwaite, Thomas E., M.D., Consulting Physician to the Post-Graduate Medical School and Hospital, New York; President of the American Therapeutic Society.

Senn, Nicholas, M.D., LL.D., Ph.D., Professor of Surgery in the Rush Medical College (in Affiliation with the University of Chicago), Chicago, Illinois.

Shands, A. R., M.D., Professor of Orthopedic Surgery in the Columbian University, Washington, D. C., and in the University of Vermont.

Thomson, John, M.D., F.R.C.P. (Edin.), Physician to the Royal Hospital for Sick Children, and Joint Clinical Lecturer on the Diseases of Children, University of Edinburgh.

Watson, Edward Willard, M.D., Philadelphia.

Wilcox, Reynold Webb, M.D., LL.D., Professor of Medicine and Therapeutics in the New York Post-Graduate Medical School and Hospital; Physician to St. Mark's Hospital, New York.

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Treatment

ANEURISM OF THE DESCENDING THORACIC AORTA

A CLINICAL LECTURE DELIVERED AT THE JOHNS HOPKINS HOSPITAL, BALTIMORE

BY WILLIAM OSLER, M.D.

Professor of Medicine, Johns Hopkins University; Physician-in-Chief, Johns Hopkins Hospital, Baltimore

The unusual experience of three cases within a year affords an opportunity to discuss the general features of the 14 cases of aneurism of the descending thoracic aorta, which have been in the wards since the opening of the hospital.

No portion of the aorta is so little subject to aneurism. The strain of the powerful systole of the left ventricle is expended chiefly on the arch itself, and, while atheromatous changes are common enough in the descending aorta, they are relatively less frequent and less advanced. The absence of large branches is doubtless an important factor, as degenerative changes are much more common about the orifices of vessels. This is well illustrated by the frequency with which we see patches of atheroma about the orifices of the intercostal vessels in an aorta elsewhere sound. The relative frequency is variously given. If you add together the statistics of Crisp, Lebert, and Myers, the descending thoracic aorta was involved in 49 cases, the ascending aorta in 159, the arch in 113, and the abdominal aorta in 83. In 64 cases of aneurism of the aorta among 2060 autopsies in the pathological department of the Johns Hopkins Hospital (Professor Welch), the arch was involved in 40 cases, the descending thoracic aorta in 13, the transverse and descending thoracic aorta in 3, the abdominal aorta in 7, and the thoracic and abdominal aorta in 1.

Clinically, too, we find that aneurism of this part of the thoracic aorta is much the least frequent; in fact, it is much less

common in the wards than it is in the post-mortem room, owing to the latency and absence of characteristic physical signs in many cases. I cannot at the moment tell you accurately the relative frequency with which it has occurred in our wards, but there have been only 14 cases, a number which may be exceeded by aneurism of other parts of the aorta in a single year. Of 88 cases at St. Bartholomew's Hospital analyzed by Oswald Brown,[1] only 8 were of the thoracic aorta.

Etiology.—Syphilis and strain or injury are the two great causes of aneurism, which accounts for the fact that men are so much more often attacked than women. Of the 14 cases, 13 were males and one female. Five of the cases were in negroes. In only 6 of the cases was there a positive history of syphilis. In 7 it was denied; in one no history was obtained. Strain or injury may have been a factor in many of the cases. As in tabes, the more carefully you inquire into the history in cases of aneurism the larger is the percentage with syphilis. In men under thirty-five years of age it is almost the sole factor, and, while there may be nothing histologically to show the nature of the arteriosclerosis, the limitation of the disease usually to the arch or to an area in the descending aorta in a vessel otherwise healthy always seems a suggestive feature. No doubt any of the acute infections may be associated with a patchy mesarteritis, and the weakened wall may in a strain or sudden injury be split as if cut with a knife (as is shown so well in the illustration I pass around). (Frontispiece.)

Symptoms.—*Latency* is a special characteristic of a certain proportion of the cases. There may be no symptoms whatever, and the first indication of trouble may be a sudden syncope from internal hemorrhage, or a profuse and fatal vomiting of blood, or hemoptysis. The colored illustration (frontispiece) illustrates this very well. In 1882 I performed for Dr. Rogers, of Point St. Charles, a post-mortem on a woman, aged about 35 years, who had always been very well and strong. One night she got out of bed to go to the water-closet, felt faint, called to her husband, vomited a small amount of blood, fell into a deep syncope, and died in a few minutes. At the post-mortem the stomach contained an enormous mould of blood. The mucous membrane was smooth and clear;

[1] Aneurism of the Aorta. H. K. Lewis, London, 1885.

the liver was not cirrhotic; there was nothing in the gastro-hepatic omentum. On slitting up the esophagus the condition shown in this colored drawing was found. There was an erosion of the mucous membrane which led directly into a small aneurism about 5 x 5 cm. in extent. From the surface of the aorta, as you see in the drawing, there is a linear slit about 1.5 cm. in extent, the margins clean-cut, which leads directly into the aneurismal sac. Three of our cases in the hospital were latent.

Case II.—*A robust man, aged about 35 years; comminuted fracture of the lower jaw; operation under ether; recovery from the ether; sudden death from hemorrhage into the left bronchus.*

The patient came to the dispensary on September 6, 1890, having had a fracture of the lower jaw, which was wired under ether. During the operation the breathing became very irregular, but the patient recovered and partially dressed himself. He complained of hoarseness and of pain in the left side of the chest. He was left in the recovery room, where he was found shortly after, lying in a pool of blood, with blood streaming from his nose and mouth. He died in a few minutes.

The heart was not enlarged (autopsy No. 100), the valves were normal, the thickness of the left ventricle was 18 mm. Just at the beginning of the descending aorta there was an opening 17 x 15 mm. leading into an aneurismal cavity 7 x 5 cm. in diameter, projecting forward, and at the upper end there was an opening 2 cm. in diameter into the left bronchus, which was partially closed by a mass of fibrin. The bronchi of both lungs were filled with soft clots. The cavity of the aneurism was filled with firm masses of fibrin. There was nothing of note in the other organs.

Case V.—*Old man, aged 78 years; admitted with dyspnea, edema, and albuminuria; death with uremic symptoms; no suggestion of aneurism.*

Charles Kusklinsky (Gen. Hosp. No. 11,890), aged 78 years, white, was admitted on January 28, 1895, complaining of shortness of breath. Very little history could be obtained, owing to his condition. He had been ill for four months, in bed most of the time, with cough and dyspnea. No history of syphilis.

The patient had edema of the face and eyelids and Cheyne-Stokes breathing, and rapidly became irrational. He had a barrel-shaped chest and signs of emphysema of the lungs. The apex beat was outside the nipple-line, impulse forcible and punctate. There was a rough systolic murmur at the aortic area and a soft diastolic and a loud systolic murmur at the apex. The urine contained albumin and tube-casts.

He died on January 31. There was no suspicion of aneurism.

The autopsy (No. 620) showed dilatation of the arch of the aorta with much atheroma of the intima. The first part of the abdominal aorta formed a spindle-shaped aneurism. At the middle of its course the thoracic aorta measured 14 cm. across; at the diaphragm, 19 cm.; opposite the celiac axis, 14 cm. The spindle was 20 cm. in length. There was extensive sclerosis of the valves and moderate hypertrophy of the left ventricle.

Case VI.—*Arteriosclerosis; chronic nephritis; dropsy; death in a uremic*

convulsion; aneurism of the descending thoracic aorta; aneurism of the abdominal aorta.

Stephen A. Carmack (Gen. Hosp. No. 17,271), aged 54 years; admitted September 11, 1896, complaining of shortness of breath, cough, and swelling of the legs and abdomen. The patient had been a healthy man. He denied syphilis. He had been much exposed and had been a heavy drinker. For two months he had had signs of dropsy, at first in the legs and face. He had ascites and edema of the legs. He passed only a small quantity of urine, which contained albumin and tube-casts. The apex beat was just outside the nipple-line; no murmur. There was general arteriosclerosis. The abdomen was tapped, and nearly four liters of fluid removed. There was no suspicion whatever of aneurism.

At 2 P.M. on the 21st he died in a uremic convulsion.

At the autopsy (No. 852) there were chronic diffuse nephritis, hypertrophy of the heart, great sclerosis of the arteries, cirrhosis of the liver, and marked sclerosis of the ascending aorta. Five centimeters beyond the origin of the innominate there was an adherent fresh clot. In the middle portion of the thoracic aorta was an aneurismal dilatation measuring 8 x 5 cm., which was occupied by a firm thrombus. There was a second aneurism of the aorta, measuring 4 x 5 cm., 1 cm. below the origin of the superior mesenteric artery and extending to within 5 cm. of the bifurcation of the aorta.

Owing to the deep and protected position of the descending thoracic aorta, you can readily understand that the symptoms may be more pronounced than the physical signs. Practically they are the same as those of aneurism of the arch,—pain, dyspnea, cough, and difficulty in swallowing; but aneurism of this part may present three special features: first, the close relation to the spine and the frequency with which the tumor passes backward make pain in the back and pain along the sides from pressure on the nerves very marked features; secondly, the relation of the vessel makes pulmonary symptoms more common; and, thirdly, the close connection of the aorta with the esophagus may cause difficulty in swallowing.

The patient in Ward E, who died last week (Case XIII), and whose aneurism I show you here, illustrates many of these features very well, particularly the intensity of the pain in the chest and the dyspnea. Without any localized, definite pulsation, there was a diffuse heaving of the upper sternum and in the second and third right interspaces. The diagnosis of aneurism was made, but we thought it was of the arch. A puzzling feature about the case was the hematemesis. He had had at intervals abdominal pains which we could not associate with the aneurism. On the night of October 14 and 15, with intense pain, he vomited a small amount of blood

and he had tarry stools. On the night of the 18th he again vomited blood. He had had no sign of pressure on the esophagus, yet we naturally thought the blood was due to rupture of the sac into the gullet. It turned out that the diffuse heaving impulse, which was so definite, was due to a general dilatation of the arch of the aorta. Projecting back just from the termination of the arch and from the first part of the descending aorta there was the aneurism which I show you, about 6 cm. in extent, which rested upon the bodies of the fifth, sixth, and seventh vertebræ, which were slightly eroded. The abdominal pains and the vomiting of blood were due to a latent ulcer of the stomach in the lesser curvature and posterior wall.

Pain is a very variable symptom in thoracic aneurism. While rarely absent throughout the course, it is present only in a marked degree when there is pressure on the thoracic wall. There may be paroxysms of pain, often simulating angina, in small aneurisms of the root of the aorta; in fact, there is a special group of cases in which angina pectoris is the initial symptom of aneurism of the aorta. Trainor, whose aneurism some of you have watched with so much interest for nearly two years, illustrates one feature of the pain very well: at first he suffered most intensely, but as the aneurism eroded the sternum and the first and second ribs and the sternal half of the clavicle, and bulged beneath the skin, he became much more comfortable, and for the past six months he has had no pain whatever. There may be neither pain, cough, nor dyspnea. Case III, a robust, healthy looking fireman (Fig. 2), had no pain while the sac eroded the ribs, but he first noticed a big pulsating tumor of the back. In the cases with erosion of the spine, pain reaches its maximum degree of intensity and persists. This feature was well illustrated in the cases of Colmus (Case VIII) and Leonard (Case XII). These poor victims were never without pain and required at times enormous doses of morphin. Colmus took once as much as thirty-eight grains in the day. These are almost invariably cases in which the sac involves the vertebræ and the ribs. In Case IX, on the first admission aneurism was not suspected, and the patient was supposed to have intercostal neuralgia. There were marked hyperesthesia of the skin in the left axillary region and points of tenderness at the angles of the ribs and at the sternal border. When readmitted nineteen months later the pains had become much more severe, she had difficulty in swal-

lowing, and a well-marked tumor had appeared in the left back. Herpes zoster has been met with in such instances. In Case VIII there was a wide area of anesthesia corresponding to the intercostal nerves, which had been destroyed as the sac grew through the chest wall.

The attitude of some of these patients is very remarkable. Leonard, you remember, lay invariably on his right side and on his abdomen. Colmus would rest prone for hours with a pillow under the abdomen. Pressure always seemed to give relief, and one patient often slept bent double upon his knees.

In thoracic aneurism pulmonary symptoms are always marked. Cough and shortness of breath are perhaps the most constant features in involvement of the arch. They are a little less constant in aneurism of the descending portion of the aorta. Of these 14 cases 10 at some time complained of these two symptoms. Orthopnea with stridor is naturally not so common. In certain of the very chronic cases (as the remarkable ones which I will speak of later under diagnosis) there are recurring attacks of dyspnea with cough and expectoration of blood. Hemoptysis was present in only 3 of the 14 cases. This may be due to a weeping through the lung tissue itself, which forms part of the sac, as in Cases X and XI, or it may be, as in Case II, a terminal hemoptysis, due to perforation of the left bronchus.

A remarkable group of pulmonary symptoms may be caused by pressure on the main bronchus or on one of its chief branches, leading to a bronchorrhea, a diffuse bronchiectasis with the expectoration of large quantities of mucus. Sometimes there is an extraordinary purulent bronchiectasis with peribronchial suppuration and the formation of multiple cavities, so that the patient may present the features of an extensive tuberculosis of the lung. Or there may be the simple atrophy of the lung from pressure, as was present in Cases VIII, XI, and XII. As the sac grows into, and is covered by the pleura, acute inflammation of the membrane is common, leading frequently to union of the two layers. Effusion did not occur in any of our cases. It is sometimes present in aneurism of the arch. Rupture into the pleura occurred in Cases III, X, and XIV.

Considering the close relation to the esophagus, it is surprising that difficulty in swallowing was not a common symptom. It was

FIG. 2.—Aneurism of the descending thoracic aorta showing flat tumor in the left infrascapular region (Case III). The lower prominence is a large subcutaneous blood cyst.

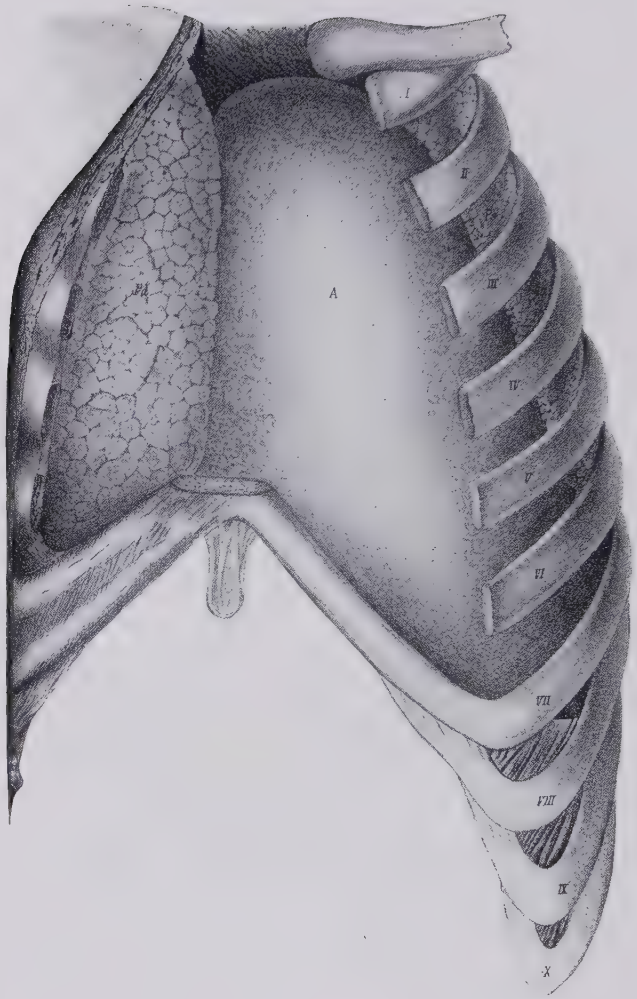

FIG. 3.—Sokolowski's case of aneurism of the ascending aorta, arch, and descending aorta of twelve years' duration. A, Aneurismal sac; Pd, Lung. (Reproduced from the Deut. Arch. f. klin. Med., 1877, xix, 623.)

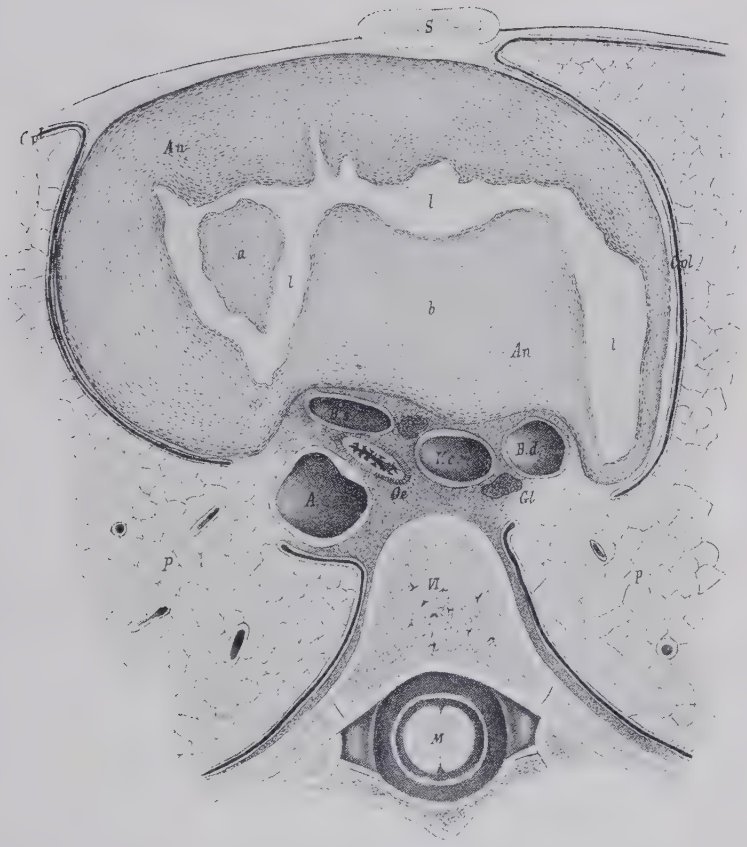

FIG. 4.—Sokolowski's case of aneurism—horizontal section at the level of the sixth thoracic vertebra. *M*, spinal cord; *S*, sternum; *C.pl*, costal pleura; *P*, lung; *Oe*, esophagus; *V.c*, descending vena cava; *B.d*, right bronchus; *B.s*, left bronchus; *Gl*, gland; *An*, aneurismal sac with coagula of almost cartilaginous consistency (*b*) and a free coagulum (*a*). (Reproduced from the Deut. Arch. f. klin. Med., 1877, xix, 623.)

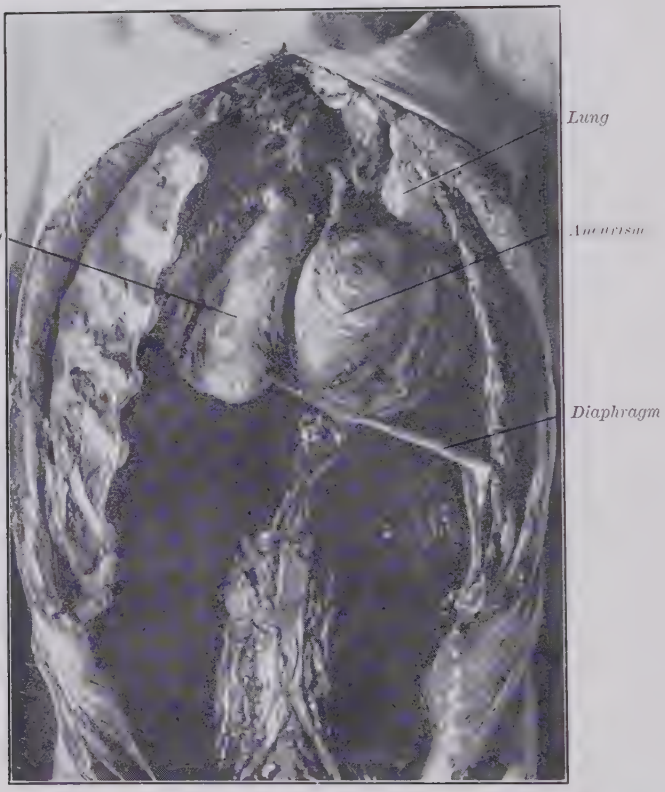

FIG. 5.—Aneurism of descending thoracic aorta. Case (Leonard) showing the dislocation of the heart to the right. From a photograph.

present in only two of the cases; and in only one (Case XII) did rupture take place into the gullet.

Physical Signs.—There may be none when the sac is small and deeply placed, and death may occur from rupture into the pleura or gullet or trachea. There may be no distinctive signs even when there is a colossal sac, as in Sokolowski's case (Figs. 3 and 4), in which the aneurism filled the left side of the chest.

Inspection, carefully and systematically made, rarely fails to give most important information. In eleven of our cases pulsation was visible. In 1887 I had my lesson on the value of routine in examination in this class of cases. I saw at the Girard Hotel, Philadelphia, a patient who presented very unusual and remarkable features. I need not detail his history, but there had been many diagnoses and many doubts. There was a wide area of pulsation in the front of the chest, no bulging, and a loud to-and-fro aortic murmur and a wide area of cardiac flatness. The case had been regarded as one of aortic insufficiency with remarkable hypertrophy. After examination of the front of the chest, some kind spirit, or the routine habit, prompted me to look at his back, where the diagnosis was "writ large" in a prominent pulsating tumor of the left interscapular region. Like Leonard (Case XII), he had a big sac which had pushed forward and flattened the heart against the sternum. In Leonard's case a positive diagnosis was not reached until the pulsation was noticed to the left of the spine. The pulsation, as a rule, is dorsal, and it may be only a diffuse shock, or, as in Cases III, VIII, IX, XI, XII, and XIV, there is a definite expansile tumor, which may form a large, flat prominence, as shown in Fig. 2, or there may be a circumscribed bulging beneath the skin, due to perforation of the sac through the chest wall, as in Case IX. The left interscapular region is the favorite site. In very large sacs the whole of the infrascapular region may pulsate, as it did in the case shown in Fig. 2. The pulsation may appear anteriorly, either in the second, third, and fourth left interspaces, when the sac projects anteriorly from the first part of the descending aorta, or below in the sixth, seventh, and eighth, when, as in Leonard (Case XII) and Colmus (Case VIII), the sac projects anteriorly and pushes aside the heart. A large sac from the anterior wall of the aorta just above the diaphragm may bulge forward and cause pulsation in the epigastrium below the ensiform

cartilage. In Case XIII the pulsation on the manubrium and to the left was probably due to the dilatation of the arch and not to the deep-seated aneurism. There may be only a diffuse shock without localized pulsation. A moderate-sized sac may give a wide-spread shock if the walls are protected by laminæ of fibrin. On the other hand, a large sac with dense layers of leathery fibrin may give neither a visible nor a palpable impulse. There is much of interest in the abnormal character of the pulsation of the heart in this group of cases. As shown in the photograph of Case XII (Fig. 5), the organ may be pushed far to the right and there may be a remarkable undulatory impulse—a distinct difference in the time between the heart shock and that of the aneurism. The extraordinary width of the impulse in Cases VIII and XII was a most noticeable feature. The heart seems more often to be pushed up and to the right, but in Sokolowski's case it was pushed down and to the left.

Palpation.—There are five possible physical signs to be appreciated by touch. The *diffuse pulsation* or shock is rarely absent, and may be present in quite small tumors. Not to be confounded with the true aneurismal impulse, it is the jar or shock caused by the pulsation of blood into the sac, and it may lift the adjacent chest wall or cause the whole side to throb. It may be present as a diffuse jar without any localized movement in the chest wall. The *aneurismal impulse,* an entirely different thing, conveys the same sensation as the heart impulse, and the fingers feel a forcible systolic heave, not simply a jar or shock. When there is a bulging tumor, the pulsation is felt to be expansile. A *thrill* is not often felt in aneurism of the descending thoracic aorta. It was present in only one case and was systolic in time. The *shock of the heart sounds* is usually felt over an aneurism, particularly the diastolic, which is sometimes very snapping. And lastly, a *bulging tumor* may occasionally be grasped, as in Case IX. Tracheal tugging is not so common as in aneurism of the arch. It was present in five cases.

Percussion shows changes in the normal resonance only when the tumor is large and reaches the surface. Pressure on the left bronchus may lead to changes in the lung and extensive impairment of resonance, but the areas of flatness on the chest wall, as shown in the diagrams, are small, as a rule, in consequence of the protection of the left lung. It is well to bear in mind how exten-

sive the flatness may be—the whole left front and sides of the chest in a huge sac as shown by Sokolowski's case (Figs. 3 and 4).

On *auscultation* a systolic bruit is usually heard in the cardiac region, sometimes a diastolic. The former was present in 10 cases, the latter in 7 cases, all in connection with aortic insufficiency. In small deep-seated sacs, or in the very large ones with thick walls, there may be no murmur.

The radial pulse may be smaller on the left side than on the right (4 cases), or it may be obliterated (1 case). The left carotid may be occluded.

It is to be borne in mind that aneurisms of the aorta are often multiple, and, as in Case XIII, certain of the most prominent signs may be caused by the tumor or diffuse dilatation of the arch.

Diagnosis.—Of the 14 cases, in 3 the condition was latent and unrecognized clinically. In the others the symptoms and physical signs were characteristic of aneurism. Difficulties were present in Case IX, which on the first admission was regarded as one of severe intercostal neuralgia; and in Case XII, which we thought at first might be adherent pericardium. There are three groups of cases which present serious difficulties:—

(I) When there are symptoms only and no physical signs, or the signs are not characteristic. A small sac projecting from the first part of the descending aorta may compress the bronchus, the esophagus, and the recurrent laryngeal nerve, and there may be not a single physical sign, but all the pressure symptoms of tumor—cough, dyspnea, pain, cracked voice, and dysphagia. Or there may be a huge sac causing many symptoms and lasting for many years without a single characteristic sign of aneurism. In 1882 I saw for Dr. Howard, of Montreal, a gentleman, aged 70 years, who had for many years cough, with pulmonary symptoms, and a cracked voice. He had symptoms pointing to some trouble in the chest for fully 14 years; cough in severe paroxysms, husky voice, a recurrent laryngeal paralysis, and attacks of hemoptysis. There was flatness over the left back from the spine of the scapula; no pulsation; no bruit, but the breathing was enfeebled. At the post-mortem the descending aorta was found to be dilated in its course, and from its anterior surface two aneurisms projected; one, the size of a large fist, lined with very dense laminæ of fibrin, had compressed the left lung and flattened and almost occluded

the left bronchus; the other sac sprang from the vessel just above the diaphragm.

Perhaps the most remarkable case of this sort in the literature is reported by Sokolowski.[1] The patient held a prominent position in the German government. In 1864 he had a severe attack of dyspnea. A physician, a friend, happened to come in during the attack, made a careful examination, and found, to his astonishment, flatness in the upper left half of the thorax with absence of the respiratory murmur. The heart impulse was dislocated a little down and to the left. From this time the patient had at irregular intervals severe attacks of dyspnea of short duration, during which very often the left radial pulse was not palpable. In 1869 the attacks were more numerous. In March of that year he consulted Professor Oppolzer, who diagnosed an aortic aneurism, and Professor Skoda, who diagnosed a mediastinal tumor, probably carcinoma. The patient improved during the summer and was worse in the winter. He was able to get about, although he had shortness of breath on exertion. In the winter of 1875-76, for the first time, he had bloody sputum. In the spring of the latter year he had a left-sided pleural exudate. In July, 1876, he was in Brehmer's Institution, where he came under the observation of Dr. Sokolowski. He was then 43 years old, well built and well nourished, but was extremely dyspneic and slightly cyanotic. The pulse was absent in the left radial, equal in the carotids. The heart-beat was in the seventh intercostal space in the axillary line. There was no heaving impulse anywhere over the chest. Extensive absolute flatness was present over the greater part of the left half of the thorax. There was a loud tracheal rhonchus over the whole of the front of the thorax. Nothing was audible over the greater part of the area of flatness. The tactile fremitus was lessened. Behind there was a slight vesicular murmur to be heard. The dyspnea increased, and he died July 29, 1876. On opening the thorax the right lung extended to the middle line, but the whole of the rest of the visible field was occupied by a thick mass of connective tissue. The pericardium near the left lung was visible. The latter was pushed up from behind, strongly compressed and airless. After some difficulty the heart was discovered at the left

[1] Deut. Arch. f. klin. Med., 1877, xix, 623.

angle of the large mass, which was found to be a huge aneurismal tumor of the entire thoracic aorta. The heart was not enlarged and the valves were normal. The aneurism lay between the sternum and the vertebral column and the ribs on the left side, filling the greater part of the left chest. The esophagus and trachea lay in a groove in the back of the tumor. The aneurismal sac began just 2 cm. above the orifice of the aorta. Its walls were of unequal thickness; the hinder wall was covered with a dense coagulum as thick as the fist and of the hardness of cartilage and much laminated; the anterior wall was also covered by a dense, thick coagulum. As the cross-section of the sac showed (Fig. 4), the blood passed through the center of the tumor in a very irregular, sinuous channel. Evidently it was the enormous thickness of the laminæ of fibrin that prevented the usual characteristic pulsation. It is specifically stated that there was no pulsation in the thorax and no murmur. The pictures (Figs. 3 and 4) of this phenomenal aneurism, which I do not remember to have seen referred to in the literature, are here reproduced.

(II) In a second group the symptoms and signs suggest malignant growth. Aneurism, in fact, rarely simulates new growth; thus, the question was not raised in one of our cases; on the other hand, new growth in the mediastinum, lung, or pleura may simulate aneurism very closely. The difficulty in diagnosis may be very great, and, as I have just told you, such masters in Israel as Skoda and Oppolzer took opposite sides in Sokolowski's case. In illustration of how difficult it may be, let me tell you an experience of a few days ago. I saw with Dr. Bolgiano a fairly well-nourished woman of 40 years, decubitus on the right side. Even before the night-dress was removed, I noticed a pulsation at the left side of the chest. Turned on her back, a visible impulse extended from the left sternal margin in the second, third, and fourth interspaces, lifting the chest wall with each systole. There was no bulging. On palpation there was a diffuse shock; no punctate impulse; no thrill; the second sound was felt over the area of pulsation. On percussion there was flatness over the manubrium and extending from the clavicle to the fourth interspace. On auscultation the breathing was feeble and distant; there was a systolic bruit to the left of the sternum. The apex beat was in the fifth interspace, a little outside the nipple. There was well-marked tracheal tugging;

the left recurrent laryngeal nerve was paralyzed, so that the voice was cracked. Nothing was lacking to the diagnosis of aneurism but a definite palpable impulse over the area of shock or pulsation. Had this been my first introduction to the case, I should have been in great doubt, but the conditions had been only too evident. I had seen the patient in June, with a small tumor of the left lobe of the thyroid and an enlarged gland above the clavicle. As she was about to go to Europe, we advised her to consult Professor Kocher, who diagnosed cancer of the thyroid with mediastinal extension. On her return, Dr. Finney took out a gland in the neighborhood, which proved to be cancerous. The mediastinal growth extended to the pleura and probably to the lung on the left side, the left recurrent became involved, brain symptoms came on, with double optic neuritis. There was no question here of aneurism, but the pulsation, the accentuated second sound, the systolic bruit, the involvement of the recurrent laryngeal nerve, and the tracheal tugging gave a picture more suggestive of aneurism than any I had ever before met with in malignant growth. It was the first time I had felt tracheal tugging in a case of new growth.

It is well to bear in mind that rapid loss in weight may occur in aneurism. One of our patients lost many pounds in a few months. Bramwell refers to this point in No. 2 of his recent "Clinical Studies," and suggests that it may occur in connection with pressure on the thoracic duct. This was present, however, in Case X of our series without special loss in weight.

X-ray examination may give evidence of the greatest value in those doubtful cases in which symptoms only are present. It was helpful in Case XIII. In both Colmus and Leonard, in whom an early diagnosis was not reached, we could not get much assistance from the X-ray examination. Some of you may call to mind the case in Ward F, in the early part of the year, which had been diagnosed sarcoma and in which the X-ray gave us most positive signs.

(III) In a third group of cases there are obscure and puzzling chest symptoms suggestive neither of aneurism nor of tumor. Pressure on a bronchus or the growth of the sac directly into the lung may give very obscure pulmonary symptoms—persistent cough, fever, purulent bronchiectasis, or hemoptysis. The symptoms may be those of chronic obstruction of the esophagus, and it is stated

that in attempting to pass a probang the sac has been pierced. Pressure on the intercostal nerves may cause an intense neuralgia, which may mask the other features (Case IX), or agonizing pain in the back may be the only symptom. Herpes zoster may occur, or a sudden paraplegia from rupture into the spinal canal.

The PROGNOSIS in aneurism of any part of the thoracic aorta is bad. Complete cure of an aneurism after it has attained any size is scarcely possible, but a practical cure may sometimes be effected by the lamination and obliteration of the sac. When a student in Toronto, I occasionally visited the jail with our teacher of anatomy, Dr. J. H. Richardson,—still with us, hale and hearty,—and among the prisoners was an old soldier who had been discharged from the army after the Crimean War for aneurism of the aorta, so his papers said, and, considering the large experience of the army surgeons with the disease, it is not likely that there could have been any mistake. The old man died in 1885, 30 years after the Crimean War, and the late Dr. J. E. Graham, of Toronto, sent the specimen to me to have drawn and described. At the junction of the arch and descending aorta was a healed saccular aneurism projecting forward. At the distal margin of the sac were two openings, one of which communicated with the natural lumen of the vessel, the other with a dissecting aneurism which had split the coats of the aorta in its entire length and in the greater part of its circumference, as shown in the figure in Dr. Graham's paper.[1] The aneurism in this case, if we take the diagnosis on the patient's discharge papers, must have lasted 30 years. This is not unlikely. Dr. Whipham, of St. George's Hospital, gives an account of a man whose thoracic aneurism had been recognized for twenty-five years. I saw at the Philadelphia Hospital in a very old woman three healed aneurisms in the aorta, all filled level with firm, gray coagula. We must remember that an aneurism is not always a progressive lesion. There may be an arrest, and, with a gradual deposition of fibrin and condensation of the coagula, the further distention may be prevented and the blood may run smoothly over the mouth of a sac the surface lamella of which may be as smooth as the palm of the hand. The prognosis, so far as duration of life goes, is rather better, I think, in aneurism of the descending part

[1] Amer. Jour. of the Medical Sciences, 1886, xci, 155.

of the thoracic aorta. Sokolowski's celebrated patient lived twelve years after the discovery of the lesion, which must have already existed for some years. The probability is that in Dr. Howard's case, of which I spoke, the disease had been present 14 years.

Treatment.—Aneurism of any part of the thoracic aorta is a very hopeless disease. A few rare cases are cured spontaneously or by artificial means; in a few the condition becomes chronic and the patients linger for years, usually in distress and pain, not often in comfort.

The treatment has in view three objects:—

First, the relief of the more urgent pressure symptoms. The patients often come into the wards with orthopnea and cyanosis, or there is pressure on the superior cava. In no condition is a full and free bleeding more useful, relieving the pain, the distress in breathing, and the cough. In no way can the blood-pressure be lowered more promptly. Plenty of blood should be taken, 25 or 30 ounces. Nowadays we are afraid of the lancet, and, while we are bleeding more often, we are not bleeding freely enough. The rest in bed alone may be followed in a few days by a great change in the patient's condition, relief of the cough, the dyspnea, and the pain.

Secondly, to reduce the strain upon the aneurismal sac. Certain measures reduce the number of heart-beats, lessen the frequency with which the sac is distended, and reduce the pressure with which the blood flows in the sac. Complete rest lowers the heart-rate from twenty to thirty per cent., and if we take a heart-rate at 70 per minute, or 100,000 in the twenty-four hours, lowering only ten or fifteen beats in the minute saves many thousands of strong throbs in the sac. Absolute rest lowers, too, the blood-pressure, but this is effected much more surely by a reduction to the minimum of the amount of food and drink. Tufnell's diet consists of: breakfast—two ounces of bread and butter and two ounces of milk or tea; dinner—three ounces of mutton, three ounces of potatoes or bread, and three ounces of claret; supper—two ounces of bread and butter and two ounces of tea. There is at present in the hospital a patient who has had the courage to undergo a rigid Tufnell treatment for four months. His pulse-rate fell from 100 to 70, the blood-pressure gradually sank from 160 mm. to 95 mm., and the visible pulsation to the left of the sternum has

gradually disappeared. His voice, which was cracked, has been very much improved, the pains have ceased, and all signs of suffusion and congestion of the face have disappeared. How far the sac has been permanently consolidated it is difficult to say, as you must bear in mind that simple rest in bed will sometimes cause very marked diminution in the size of the sac.

Thirdly, measures which promote coagulation of the blood in the sac. Rest and the low diet favor coagulation, as was known to Valsalva, diminishing the rapidity of the flow of blood and increasing the fibrin-forming factors. Of medicines, the iodide of potassium is most helpful. Whether or not it increases the coagulability of the blood is doubtful, but it relieves the pain, and perhaps, as Balfour suggests, it promotes thickening and contraction in the sac. One has to bear in mind that syphilis is an important factor in a majority of the cases of aneurism, and the iodide may help against it. The drug need not be given in very large doses: we get all the good effects from 10 or 15 grains (0.6-1.0) three times a day. Gelatin, which was introduced of late years by certain French writers, has been given a thorough trial here, and, while it has seemed to help in some cases (particularly that of Colmus) in relieving the pain, we have had no case in which the aneurism has been cured. We have in a few instances used calcium chloride to promote coagulability of the blood.

In suitable cases surgical measures may be employed. We have not had a single instance of aneurism of the descending thoracic aorta in which we thought it well to employ the method of wiring, with electrolysis, which has been done here so frequently by Dr. Finney, and in some cases successfully. In Case III the wall of the sac was scraped by the method recommended by Macewen.

Fourteen cases with 13 deaths is a comment upon treatment! But it is satisfactory to feel that in a majority of these patients the suffering was greatly relieved, and that they were made as comfortable as our art and good nursing could make them,—and, after all, in such a hopeless disease, this is to fulfil the highest mission of the physician.

APPENDIX

CASES OF ANEURISM OF THE DESCENDING THORACIC AORTA[1]

CASE I.—*Cough and dyspnea for two and one-half years. Well-marked signs of aneurism. Hemoptysis; death. Dilatation of the arch. Aneurism of the descending aorta, erosion of the lung and of six upper dorsal vertebræ.*

William Lewarn (Gen. Hosp. Nos. 897, 1099, 2020, 2233, 2518), aged 46 years, white, a baker, was admitted for the first time on February 26, 1890, complaining of cough and shortness of breath. The family history was unimportant. He had had lues at 15; hematuria at 26. The present illness began in November, 1889, with painful micturition.

The patient's condition was improved during each stay in the hospital. At the third admission the following note was made: There is a marked heaving pulsation of the upper left section of the chest in front. There is no thrill. The second sound at the apex is replaced by a diastolic murmur propagated into the axilla and toward the sternum, where it becomes more intense. Over the area of dulness, which extends from the upper border of the clavicle to the third rib on the left side, and laterally from the left sternal border to the middle of the clavicle, both sounds are of a booming character, and there is a soft systolic murmur in addition to the diastolic. The systolic murmur is particularly loud over the clavicle. There is no diastolic shock. Marked tracheal tugging.

The patient was brought to the hospital for the last time on February 2, 1892, having had a hemoptysis the night before, during which he became quite unconscious.

On admission there were great prostration, lividity of the face and hands, great dyspnea, and a small, soft pulse. There had been great emaciation since the previous admission, and the dyspnea and cough were increased. The patient now frequently coughed up thick, bloody-looking mucus. The left radial pulse was only perceptible at times. Both pupils were contracted. Breathing was almost entirely diaphragmatic. The area of dulness over the aneurism noted at the previous admission extended to the anterior axillary line and downward to the third rib on the left side.

On February 6, after a sharp hemorrhage of bright-red blood, the patient was suffocated, and respiration ceased immediately.

Anatomical Diagnosis (*Autopsy No. 167*).—Aneurism of the ascending, transverse, and descending parts of the aorta, with erosion of the bodies of the first six thoracic vertebræ. Ulceration into the lung. Congenital cyst of the right kidney, with atrophy. Old tuberculosis of the left lung.

The left lung voluminous; does not retract on opening thorax. Immediately below the upper margin of the sternum is a firm mass. The heart is slightly twisted to the left side. Behind the ascending aorta is a large aneurism, intimately adherent to the vertebræ. The sac is closely attached to the left lung, which really forms a part of the sac and which has been ulcerated into by the aneurism. There is a cavity in the upper lobe filled with blood. The aneurism springs from the transverse and descending portions of the aorta and is 12 cm.

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[1] Dr. Futcher and Dr. Hume have very kindly helped in making the abstracts of these cases.

in diameter at its widest part. The erosion of the bodies of the first to the sixth vertebræ extends almost into the spinal canal. The intervertebral cartilages are intact.

CASE III.—*Syphilis at 29 years. Injury of back 12 years before admission. Five years before numbness and pain in left hypochondrium. Pulsating lump in the back; large superficial blood-sac; Macewen's operation. Rupture into left pleura; death. Large sacculated aneurism of the descending aorta, with erosion of the seventh and eighth vertebræ and the sixth, seventh, and eighth ribs; perforation of sac through the chest wall.* (Fig. 2.)

E. B. (Gen. Hosp. Nos. 7290 and 7479), male, aged 44 years, colored, a fireman, was admitted on May 6, 1893, complaining of pain in the left side.

The family history was unimportant.

The patient had malarial fever at 21, syphilis at 29, gonorrhea several times. His wife had had seven children and one miscarriage.

Five years ago he began to have pain in the left hypochondrium, which radiated to the back. There was numbness in the same region. The patient had been sleepless, but had been able to work until ten weeks before admission. He had no cough or dyspnea. Three weeks previously he had noticed a lump in the back, which "beat tremendously" sometimes. This caused him no pain, but made him uncomfortable. Twelve years previously a man weighing 200 pounds had fallen on his back, but had caused him no trouble at that time.

On admission the patient was found to be a well-developed negro, not anemic and without congestion in the face. His pupils were equal and reacted normally. The pulse was 76; the left radial was only just perceptible. The apex beat was not distinctly visible, but there was a diffuse throbbing in the nipple region and an impulse in the fifth space inside the nipple-line. At the fourth rib the cardiac dulness extended a little outside of the nipple-line. Over the sternum there was slight throbbing. On auscultation a diastolic murmur was heard at the level of the fourth rib and over the upper two-thirds of the sternum, as well as in the carotids. There was no tracheal tugging. There was a large hemispherical bulging tumor in the lower interscapular region, occupying the space between the spine and the angle of the scapula, and extending 3 cm. below the angle of the scapula. Its upper border corresponded to the fifth thoracic vertebra. (See Fig. 2.) There was an expansile pulsation, but no thrill, over the mass. A systolic and a diastolic shock were present, the former more marked. The ribs were apparently eroded and the sac of the aneurism seemed close to the skin. When the patient held his breath, there was a soft, distant to-and-fro murmur, probably transmitted. There was no sensitiveness over the tumor or affected ribs, but lower down there was tenderness over the unaffected ribs. There was no throbbing in the abdominal aorta.

On June 1 the patient was transferred to the surgical wards.

Between June 11 and July 23 Macewen's needling operation was done by Dr. Halsted on twelve or more occasions, and on the latter date it was noted that there was great improvement in the patient's general condition. He could lie with comfort on either side, could use the left arm better than before, slept better, and had less pain. The aneurism, though pulsating less, was about the same size as before.

On the night of August 4 the patient began to have a rapid, weak pulse and dyspnea. By August 7 he began to complain of great pain in the left side and could not lie down unless given morphin. The pulse ranged between 110

and 140, the respirations between 25 and 40, and the patient was very weak and depressed. On August 10 a moderate degree of ascites was noted.

On August 12, after a good deal of pain, the patient died.

Only on one examination did the urine show any albumin; no casts were seen.

Anatomical Diagnosis (Autopsy No. 440).—Saccular aneurism of descending thoracic aorta; rupture into left pleural cavity; erosion of ribs and vertebræ; appearance of aneurism in the back; retraction of the left lung; displacement of the heart and pericardium; general arteriosclerosis.

In the left back, extending from the spine of the scapula to the tenth thoracic vertebra, is a large, oval, fluctuating swelling.

Heart-muscle flabby. In the aorta, commencing just above the valves, are many patches of sclerosis, most numerous around the openings of the innominate, the left carotid, and the left subclavian arteries. Arising from the postero-lateral wall of the descending aorta is a large aneurismal sac, the orifice measuring 6.5 cm. across. The walls of the sac are thinner as they leave the aorta, until the intima and media finally seem to disappear. The sac forms a large irregular mass, projecting into the left pleural cavity, its upper border corresponding to the fifth intercostal space and the lower to the tenth rib. At the upper part of the mass is a small opening partially closed with clot. The left pleural cavity is filled with a huge, soft, dark-red blood-cast, while the left lung, pressed upward and backward, is completely collapsed and occupies as small a space as possible. The heart and pericardial cavity are displaced to the right. The sac has eroded the sixth, seventh, and eighth ribs, the seventh having completely disappeared for a considerable distance. The cavity of the sac communicates, through an opening in the thoracic wall, with a large blood-sac, 18 x 10 cm., over which the muscles are stretched exceedingly thin. Further, passing backward, the sac has eroded the bodies of the seventh and eighth thoracic vertebræ, and a sac the size of a robin's egg projects to the right of the spine. The intervertebral discs have suffered less than the bodies of the vertebræ.

The sac is filled throughout with soft clots; there are no laminated thrombi and no evidence of granulation tissue in the walls. The right lung shows slight passive congestion. The other organs are not markedly abnormal.

Case IV.—*Alcoholic history; pain in the side and dyspnea; pulsation to the right of the sternum; paralysis of the left vocal cord; urgent dyspnea; death. Dilatation of the arch; fusiform dilatation of the thoracic portion; erosion of the fourth and fifth vertebræ; small ulcer of stomach.*

P. H. D. (Gen. Hosp. No. 11,469), aged 49 years, colored, a waiter, admitted on November 22, 1894, complaining of pain in the left side and shortness of breath. The family history was unimportant.

Gonorrhea ten years previously. No history of syphilis. Until a few years before admission the patient used to drink a great deal of whiskey and smoked to excess. He chewed tobacco very freely. He had erysipelas 13 years ago, and smallpox 30 years ago. Three years before admission the patient had "rheumatism" in one foot, the front of the foot being swollen and very tender, but no other joints were involved.

For three weeks the patient had had pain in the left lower chest, which had been constant and aching in character, with occasional sharp, shooting pains passing upward. The pain was worse on walking or deep breathing. For five days the patient had been short of breath. He had had severe attacks of

vertigo at times. The digestion was good; the patient slept well and did not complain of dyspnea at night. Eight years previously he had noticed in front of his right knee a small, shot-like lump. Four or five months later a similar lump appeared over the left knee, and still later others on each elbow. The patient could move the skin freely over these and could move the lumps on the tissues. They had grown slowly up to a year before admission, since when they had remained of the same size. They were painless.

On January 24, 1895, I dictated the following note: There is a very pronounced throbbing in the second right interspace and over the second right costal cartilage. This is visible as well as palpable, and is in contrast to the same area on the opposite side. There is some dulness over this area, and a loud, rasping systolic murmur is heard everywhere over the manubrium, as well as a loud diastolic murmur down the border of the sternum. Tracheal tugging apparently present. A systolic thrill in the vessels of the neck.

On January 29 the patient complained of severe palpitation of the heart and of dyspnea and vertigo. He also had numbness in the fingers of the right hand. The pulse was rapid and intermittent.

On January 31 Dr. Thayer noted a well-marked heaving impulse in the first right interspace and about the sterno-clavicular joint, as well as in the suprasternal notch. The sternal end of the clavicle was forcibly raised at each impulse. The cardiac flatness was quite obliterated by pulmonary resonance. There was a systolic murmur at the apex, transmitted into the axilla.

On February 8 I noted the striking contrast in the size of the two radial pulses, the right being much the smaller. The pupils were not unequal. There was no thrill, but an unusual grade of shock felt throughout the chest.

On February 26 the patient was very hoarse and had a distressing cough. The area of pulsation was 6.5 cm. in extent, and over it there was a double murmur. The right pupil was slightly larger than the left.

After March 1 there was a great deal of viscid sputum, containing much ropy mucus. No elastic tissue or tubercle bacilli were seen.

On March 8 Dr. Warfield noted a complete paralysis of the left vocal cord.

On March 14, after several attacks of dyspnea and two attacks of vomiting, the patient's face became puffy on the right side. He soon became unconscious and fell out of his bed, dying soon after being put back.

The urine had never contained more than a mere trace of albumin until the last two weeks, when albumin was present in somewhat larger amount. There were a few hyaline and granular casts present throughout his illness.

Anatomical Diagnosis (Autopsy No. 636).—Fusiform aneurism of the descending thoracic aorta; pressure upon and erosion of the dorsal vertebræ; chronic endocarditis of aortic valve; arteriosclerosis; heart hypertrophy and dilatation; chronic passive congestion of the viscera; chronic diffuse nephritis; pressure upon the recurrent laryngeal nerve; ulcer of the stomach.

The peritoneal cavity contains 1000 c.c. of clear yellow serum. Precordial space 22 x 16 cm. in extent. The left lung is retracted in large part.

The pericardium shows minute hemorrhages on the left side, in the parietal layer, where it is adherent to the lungs. There are old adhesions between the pericardium and the aorta. The heart is hypertrophied, especially the left side. It is also dilated. The aortic valve segments are thickened and the edges retracted, not, however, beyond the corpora Arantii. There is a diffuse dilatation of the aorta, commencing just above the valve and extending through

the ascending and transverse portions. At the origin of the innominate it measures 10 cm. At the beginning of the thoracic portion is a further dilatation, which extends 17 cm., is fusiform, and involves all the coats. Its central part is covered with lightly adherent, laminated fibrin. The dimensions of the aneurism are, at its beginning, 12 cm.; at its widest part, 13 cm.; at its lower end, 8.5 cm. It extends backward and to the left, and is firmly adherent to the fourth and fifth thoracic vertebræ, whose bodies it has eroded. The aorta is the seat of extensive nodular endarteritis. In the adhesions between the aorta and the lung is a calcified and pigmented gland which compresses the origin of the recurrent laryngeal nerve.

The kidneys are the seat of a diffuse nephritis, with atrophy.

A small ulcer, extending into the submucosa, is situated on the superior surface of the lesser curvature of the stomach.

The other viscera show considerable chronic passive congestion.

CASE VII.—*History of syphilis; alcoholism; pain in chest and dyspnea, with loss of 36 pounds in weight in three months. Bulging with pulsation of manubrium; tracheal tugging; impaired resonance in the left upper interscapular region; much dyspnea and cyanosis; fever; saccular aneurism of the upper part of the descending aorta; erosion of the second and third vertebræ; compression of the trachea.*

John Connolly (Gen. Hosp. Nos. 26,523 and 26,797), aged 39 years, white, a sailor, admitted on May 18, 1899, complaining of difficulty in breathing and of pain in the chest. The family history was unimportant.

Syphilis 12 years previously. Alcohol to excess; had often been drunk. Four months before admission, while on a sea-voyage, the patient had a sharp pain in the left side near the heart and passing to the left shoulder-blade. The pain had continued ever since, but was severer at times and made him short of breath, so that work had become impossible. Two months previously his voice became roughened and he began to cough; no dysphagia. He had lost 36 pounds in three months.

On May 19 Dr. Futcher made the following note: Dyspnea marked; voice husky; cough has a suggestive brazen quality. Tracheal tugging palpable. Bulging over the manubrium and precordial area, where there is a slight systolic pulsation. No bulging in the left infrascapular region. Heart sounds are well heard over the area of bulging at the base of the sternum, the second sound being ringing. No murmurs are heard. There is no palpable thrill over the precordium, but a fairly distinct diastolic shock.

On May 22 the patient received 250 c.c. of one per cent. gelatin solution. The coagulation time was not, however, reduced by this procedure.

On May 31 Dr. Futcher noted distinct pulsation at the top of the manubrium, with lifting of both clavicles. The patient was discharged on June 3, and returned on June 15, 1899, complaining of shortness of breath. During the two previous days, while walking, he had had pain in the lower abdomen and testicles, followed by swelling of the testicles. The patient had been rowing the day before, but had to stop suddenly on account of dyspnea. There was slight pain occasionally under the left scapula. The patient's condition had not altered much since his previous admission, except that in the left upper interscapular area there was now a slight dulness. No murmurs were heard in this area.

On June 16 Dr. Futcher noted that the right radial pulse was larger than the left, that tracheal tugging was very distinctly palpable, and that there

was marked bulging over the base of the sternum. The heart sounds were everywhere clear.

On June 20 the patient received a second gelatin injection and his coagulation time was reduced from three and a half minutes to one and a half minutes. Several further gelatin injections were given during June and July, but they caused him so much pain that they were discontinued.

On July 20 it was noted that the right pupil was smaller than the left.

On September 8 the patient commenced to have severe attacks of coughing, the face and hands becoming cyanotic. There was much vomiting. The patient became afraid to go to sleep, fearing suffocation. No bulging was made out in the back at any time, nor any thrill.

On September 10 superficial pleuritic rubs were noted at the bases, with coarse râles on the left side.

The patient's temperature, which had hitherto been normal, rose to between 103° and 104° F. The leukocyte count on September 12 was 33,000, and there was considerable expectoration of mucopurulent material. There was tubular breathing in the right interscapular region, with impairment of the percussion note in the subscapular regions.

On September 14 Dr. Futcher noted considerable impairment in resonance over the right lower lobe.

On September 15 the patient, after being unconscious nearly all day and showing twitching of the head and arms, began to gasp and struggle for breath. All efforts to revive him were futile.

Albumin was only present in the urine during the last three days before death and a few hyaline casts were present near the end.

Anatomical Diagnosis (*Autopsy No. 1417*).—Arteriosclerosis. Scar on the penis. Saccular aneurism of the descending aorta. Slight cardiac hypertrophy. Patent foramen ovale. Compression of the trachea. Slight bronchiectasis. Pneumonic consolidation and bronchitis of the right lung. Double old pleuritic adhesions.

The left bronchus where it passes below the aorta is compressed and its lumen diminished by one-half. The trachea is filled with watery pus. Beginning 2 cm. above the bifurcation, its walls are greatly compressed laterally and its mucosa covered with ecchymoses. The heart is moderately enlarged. The coronaries are slightly sclerotic and the aorta shows patchy sclerosis. Immediately beyond the origin of the left subclavian artery the aorta becomes dilated into an aneurism which involves the vessel for a distance of 12 cm. The diameter of the aneurism is 8 cm. On the right it compresses the trachea; posteriorly the esophagus is plastered close against it, and the bodies of the second and third thoracic vertebræ, which form the posterior wall of the aneurism, have been eroded to a depth of 4 or 5 mm. On the left the apex of the lung is adherent and the parietal pleura forms the lateral wall of the sac. The aneurism contains several layers of laminated fibrin.

Case VIII.—*Hard work and alcohol; no syphilis. Pain in the back in 1895; gradual increase in severity. Admission in 1898; girdle-pains and paroxysms of pain. Wide-spread area of pulsation in front of chest; pulsation in the left infrascapular region; dysphagia. Pain the prominent symptom. Death in July, 1900, five years after onset of pain. Large aneurism of the descending aorta; dislocation of the heart to the right; erosion of the eighth, ninth, tenth, and eleventh dorsal vertebræ; compression of left lung.*

U. Colmus (Gen. Hosp. Nos. 22,638, 23,641, and 24,636), male, white,

aged 41 years, a laborer in a glass factory, was admitted for the first time on April 19, 1898, complaining of pain in the left side of the back and in the abdomen. There was nothing of importance in the family history.

The patient had malaria at 16. When he was 24 he had rheumatism, involving several joints, but was not incapacitated from work. From 12 to 24 years of age he did hard manual labor on a farm. Since then he had been engaged in a glass factory. He had been a heavy drinker: for many years he took two glasses of whiskey before breakfast and eight or nine glasses of beer during the day. He smoked a good deal and was a hearty eater. When 21 he had gonorrhea. He denied ever having had syphilis.

During the summer of 1896 he did some heavy lifting of lumber, and noticed some pain in the left side a little anterior to that complained of on entrance to the hospital. About nine months previous to admission the patient began to complain of pain in the back when he got up in the morning. This would usually disappear after moving about. The pain was in the region of the eleventh and twelfth ribs behind and in the flank on the left side. It gradually increased in severity. Two weeks ago the pain spread to the abdomen, over the area between the costal cartilage of the tenth rib and the umbilicus. The pain in the back also increased, and could not be worked off, but was increased on standing or walking. It kept him awake at nights. He was unable to sleep on his back, being most comfortable lying prone with a pillow under his abdomen. The character of the pain varied: that in the back was shooting and more marked on inspiration, whereas that in the abdomen was boring. The pain is now continuous, but at some times is much sharper than at others. During the paroxysms of pain he gets relief by lying over the footboard of the bed or by other means of pressure. Occasionally he had experienced some pain on the right side of the abdomen at the level of the costal cartilage of the tenth rib, when the pains were more or less of the nature of "girdle"-pains. He was often incapacitated from work, but did not give up entirely until six weeks ago. The patient had a specially severe attack of pain early in January, 1898. This attack lasted for about three weeks, and he spent most of the time standing pressing his abdomen against the table-edge or leaning over the back of a chair in order to relieve the pain. At this time he noticed considerable swelling of the feet, which lasted two days. He had not been dyspneic.

On April 21, two days after admission, I dictated the following note: Over the left side of the thorax there is a visible pulsation as high as the second rib. Sternum is also lifted. Pulsation extends up to the third rib in the axilla. When he turns on the right side, the pulsation is seen chiefly in the lower axilla. The pulsation is diffuse, nowhere punctuate, and extends as far over as the posterior axillary line. Well-marked systolic retraction behind just below the eleventh rib. Maximum impulse on palpation is in the left parasternal line over the cartilages of the fifth and sixth ribs. No thrill. No pulsation in vessels of neck. No visible point of maximum impulse. On auscultation at the aortic area there is a soft systolic murmur. With the second sound there is a soft diastolic murmur. In the second left interspace, a loud systolic murmur and a soft diastolic. The systolic murmur is heard down the left parasternal line, and is of maximum intensity over the fourth rib. In the mitral area both sounds are feeble; a soft systolic murmur with the first sound. In the tricuspid area both sounds are well heard; no murmur. Below the left costal margin there is no murmur in the area of pulsation. No murmur in

the mid-axillary region. Over the body of the heart in the fourth interspace there is a well-marked, loud cardio-respiratory murmur. No pulsation behind, along the spine. No bruit over the area of pulsation in the lower axilla. The abdominal aorta cannot be felt. Pulsation in both femorals. In the knee-chest position there is no trace of pulsation in the back below the ribs.

In addition to the above note a rather striking feature was the marked pulsation in the epigastrium, particularly in the left side.

On April 25 Dr. Thayer noted for the first time that when the patient sat up in bed there was a quite marked pulsation in the lower left back over the eleventh and twelfth ribs in the scapular line. The relative cardiac dulness on this date extended 5.25 cm. to the right of the median line opposite the fourth interspace.

The patient remained in the hospital until July 4, 1898, when he was discharged. The pain varied a good deal from time to time, but on the whole it was less severe. The physical signs over the precordial area had not changed. He had been kept at rest and given potassium iodide, and gained 25 pounds in weight. The diagnosis on discharge was "Aneurism of the thoracic aorta."

He was admitted a second time on August 2, 1898. The pain had persisted and he had had two very severe attacks, commencing in the left side, radiating into the back and to the right side. Morphin did not relieve the pain. The physical signs were practically as they were on his first admission. At his own request, he was discharged on September 6, 1898.

The patient was admitted a third time on November 5, 1898. He remained in the hospital until his death 20 months later, on July 30, 1900. The pain had persisted, and he thought that it was a little higher up behind than on previous admissions. The abdominal pain was more cramping in character. Recently he had noticed that he had difficulty in swallowing fluids and to a less degree solids. He could not clearly locate the point of obstruction, but thought that it was in the upper part of his chest.

Soon after this admission the physical signs began to indicate that the heart was being pushed toward the right by the aneurism exerting its pressure from the left. On December 1, 1898, I made the following note: Patient says he can rest more comfortably (this was after he had received a number of gelatin injections). The pulsation is still very extensive. There is visible pulsation in the third, fourth, and fifth interspaces on the right side close to the sternum and in the right costo-xiphoid angle. To the left of the sternum there is retraction, to the right protrusion. On palpation a forcible impulse is felt to the right of the sternum as far out as the nipple-line. It is most forcible over the lower sternum. There is no forcible impulse below the fifth rib on the left side. The cardio-respiratory murmur is still extremely well marked. There is no murmur to the right of the sternum. The heart sounds over the right side are loud and both accentuated.

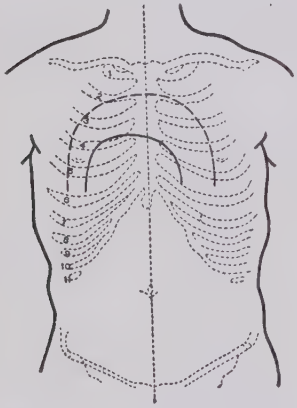
About this time we were giving the gelatin treatment of aneurism (introduced by Lancereaux) a trial. From November 9, 1898, to December 31, 1899, the patient was given 96 subcutaneous injections of 250 c.c. of 1 per cent. gelatin solution. This was an unusually large number and the treatment was continued longer than usual, owing to the very marked relief of pain which nearly always followed the injections. There were no material changes produced in the physical signs of the aneurisms.

On March 29, 1900, the following note was recorded and the area of dulness over the front of the chest was as is outlined in Fig. 6. Since the last note

the patient has been suffering rather severe pain just below the left costal margin about in the mammillary line. The pain is more or less paroxysmal in character. Patient sleeps on his face with a pillow pressed against his abdomen for relief. He is getting about 2.5 grains of morphin at a dose and requires an injection on an average every three hours. The pupils are of normal size, equal, and react to light and accommodation. The radial pulses are equal and synchronous on the two sides. The pulse is regular in force and rhythm, 92 to the minute; vessel wall slightly thickened. No tracheal tugging. Veins over the upper part of the chest and shoulders, particularly on the right side, are considerably dilated. The breath sounds are particularly clear throughout and of about equal intensity on both sides.

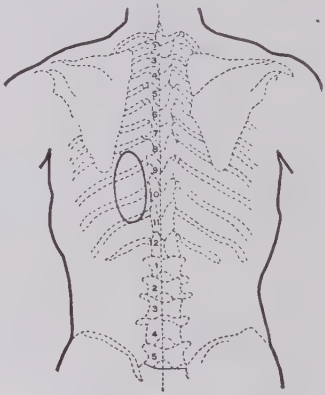
The point of maximum cardiac impulse is not clearly seen nor felt. There is a slight systolic retraction in the fifth left interspace, 9.5 cm. from the mid-sternal line. With each cardiac systole there is a visible inward tugging of the whole of the left side of the chest. A slight wavy impulse is seen in

Fig. 6.



Dash line, relative dulness; full line, absolute dulness.

Fig. 7.



Area of visible pulsation.

the third, fourth, fifth, and sixth right interspaces at the sternal border. The bulging to the right of the sternum is possibly not quite so marked as on last examination. There is no prominence over the base of the sternum. A diastolic shock is fairly well felt to the right of the sternal margin. No palpable thrill over the precordia. The relative cardiac dulness commences over the middle of the second left interspace in the parasternal line, and extends from a point in the fifth left interspace 9.5 cm. from the median line to a point in the fourth right interspace 11 cm. from the median line and just in the mammillary line. The absolute cardiac dulness is largely to the right of the median line. It extends from a point in the fifth left interspace 3.5 cm. from the mid-sternal line to a point in the fourth right interspace 8 cm. from the median line. The heart sounds are of maximum intensity to the right of the sternum. In the fifth left interspace, at the usual situation of the point of maximum impulse, the sounds are enfeebled, but both are audible. No murmur at this point. At the pulmonic area both sounds are audible and clear. The first

aortic sound is audible and accompanied by a slightly rough systolic murmur traceable upward. The second aortic is clear and relatively accentuated. Over the area of pulsation between the right sternal border and the right mammillary line the first sound has a murmurish quality, the second being rather ringing. When the patient sits up in the erect posture, there is little or no visible pulsation nor bulging made out in the lower part of the right back. When he lies on his right side, there is a distinct visible pulsation seen over the lower part of the left interscapular and upper part of the subscapular region extending from about the eighth to the eleventh ribs (see Fig. 7). This is a pulsation thrill rather than a retraction. There is no palpable thrill over this area. The note is distinctly impaired on percussion. There is no special tenderness on palpation. No bruit is heard over the area of pulsation.

From this date the patient's symptoms gradually became worse. The pain became intense. On the nights of July 13 and 14 he did not go to bed at all. He spent the entire night leaning over a window-sill with a pillow pressed against his abdomen. On July 20 he was given 38 grains (2.4 gm.) of morphin, 40 grains (2.5 gm.) of chloral, and 160 grains (10.4 gm.) of potassium iodide, with only moderate relief of the pain.

From July 22 to the date of his death he was irrational most of the time. His temperature gradually rose from this date until it reached 106.2° F. on July 30, the date of his death. During the last week he had had a double purulent otitis media, and he died with symptoms of edema of both lungs.

Anatomical Diagnosis (*Autopsy No. 1582*), *Dr. Opie.*—Aneurism of the thoracic aorta projecting into the left pleural cavity. Erosion of the vertebræ and of the ribs, with fracture of the tenth. Thrombosis within the aneurismal sac. Slight arteriosclerosis. Atelectasis (partial) of the left lung; edema of the right lung. Edema of the brain.

Immediately above the diaphragm there is a very large tumor mass springing from the region of the thoracic aorta, firmly fixed to the chest wall to the left of the vertebral column, almost entirely filling the lower half of the left cavity. The lower surface of the mass rests on the diaphragm. Its highest point is midway between the second and third ribs in the parasternal line. Its inner border is in the median line, but, being convex, it comes in contact with the chest wall at a point 2 cm. farther out. The heart is displaced to the right, so that its left margin immediately below the sternum is 0.5 cm. to the left of the median line and the tip of the left auricle is 2.5 cm. to the left of the median line. The right border of the heart is 10 cm. to the right of the median line.

The lower surface of the left lung is bound by light adhesions to the tumor mass. The right lung is almost universally bound to the chest wall by fibrous adhesions. The tumor mass, which is evidently an aneurismal sac, begins immediately above the diaphragm, the dilatation of the aorta being here limited by the pillars of the diaphragm. The sac lies behind the pleura and is covered on its right side by the pericardium. The bodies of the eighth, ninth, tenth, and eleventh dorsal vertebræ are eroded, so that the aneurismal mass projects very slightly to the right of the vertebral column. The erosion is most marked on the left side and the adjacent ribs are involved. The bodies are most affected, so that the intervertebral discs and a slight amount of bone on either side project. The tenth rib is completely eroded.

The dilatation of the aorta begins at the junction of the descending portion of the arch with the thoracic portion. It measures 17 cm. in length and

about 16 cm. in diameter, and is fusiform in shape. Its posterior wall is partly formed by the eroded vertebræ. The sac contains a very great quantity of clotted blood, and in addition, adhering particularly to the posterior wall, there is a large flattened mass, grayish red on section, firm and lamellated. This mass covers the eroded vertebræ. Adherent to the left lateral wall is also a clotted thrombosis material. The wall of the aneurism is thin,—often hardly more than a millimeter thick. Upon the anterior wall the intima resembles that of the aorta above, but is rougher, shows numerous irregular yellow places and many thin calcareous plates. The remainder of the wall which forms the posterior and lateral surfaces is red and irregular, and to the right adhere thrombus masses. The intimal surface, which has a relatively normal appearance, forms an area about 9.5 cm. across, extending from the relatively normal aorta above to that below. The circumference of the aorta before it begins to dilate is 7 cm.; where the dilatation ceases it is 7 cm. The intima of the aorta above the aneurism is very slightly irregular, there being raised areas of a yellow color. Below it is remarkably smooth, but there also exist a few similar areas. The circumference of the aorta above the valve is 8.3 cm.

The aneurism has apparently sprung from the posterior wall and grown backward toward the vertebral column. The posterior wall has been eroded so that the aneurismal cavity has come in contact with the vertebræ.

Case IX.—*First admission for intercostal neuralgia; second admission with increase of pain and dysphagia. Pulsation over manubrium and sternal end of left clavicle; pulsating tumor in left interscapular region. Discharged unimproved.*

M. B. (Gen. Hosp. Nos. 25,135 and 35,837), female, married, aged 50 years, was admitted for the first time on December 31, 1899, complaining of shortness of breath and of a sticking pain between the shoulders and beneath the sternum.

The patient's father died of some pulmonary disease; otherwise the family history was unimportant. The patient herself had for several years suffered from malarial attacks in the spring. These were contracted during trips to the country, where she was engaged in berry-picking. She had never had any other serious illness. She had borne six children, two of whom died in infancy. The others were healthy. She had never miscarried. She had been a moderate user of alcohol and had always been a hard-working woman. No history of syphilis was obtained.

Seven months previous to her admission she began to suffer pain in the left axillary and interscapular regions. The pain was sudden in its onset and was worse on deep inspiration. It was intense and at times was referred to the left shoulder. She sometimes had headache, vertigo, and weakness in the arms and legs. She suffered from some dyspnea, but had no cough.

The patient was of small stature and poorly developed. Rather emaciated and anemic. The pupils were equal. The radial pulse was of moderate volume, low tension, and regular in force and rhythm. The vessel wall was markedly sclerosed, the sclerosis being of the annular character.

The thorax was fairly well formed and showed nothing abnormal on inspection. There was no visible bulging or pulsation in the interscapular region nor was any dulness made out in this area. At the base of the left lung the breath sounds were a little enfeebled; there were a few fine, moist râles. No pleuritic friction rub audible. An interesting feature was the existence of marked hyperesthesia of the skin in the left axillary region. There seemed to

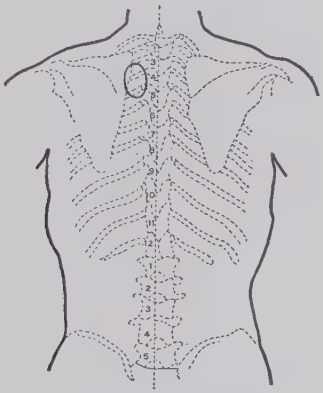
be points of special tenderness at the angles of the ribs, in the mid-axillary region and at the sternal border.

The point of maximum cardiac impulse was not visible, but was indistinctly palpable in the fourth left interspace 7 cm. from the median line. There was no evidence of enlargement of the heart on percussion and the heart sounds were everywhere feeble but clear.

The abdominal examination was negative. The urine had a specific gravity varying between 1012 and 1020. It contained a trace of albumin and a few hyaline and finely granular casts.

Owing to the negative physical signs and the hyperesthesia and tender points on the left side of the thorax, it was thought that the patient was suffering from intercostal neuralgia. The thermocautery was applied locally and she was given strychnin and iron internally. The patient improved steadily and the pain diminished gradually, so that she was able to go about the ward with comfort. She was discharged much improved on January 16, 1900.

FIG. 8.



Area of visible pulsation.

The patient was readmitted on August 12, 1901, still complaining of pain in the shoulder and back. The pain had steadily grown worse in the past year. It was of a sharp, stabbing character and kept her awake at night. She had had some difficulty in swallowing for the past few months.

The patient's general condition was much worse than on her first admission. She was suffering intense pain. The left pupil was a trifle larger than the right. The left radial pulse was a little smaller than the right. There was no visible nor palpable tracheal tug.

The thorax was symmetrical in front. The superficial veins over the front of the chest on the left side, as well as over the left shoulder, were quite markedly dilated. In the left interscapular region, commencing at the level of the spine of the scapula and extending about half-way to the angle of the scapula, as seen in Fig. 8, there was a distinct visible pulsating tumor. The most prominent point projected fully 2 cm. above the chest level and the swelling could be actually grasped. The pulsation was definitely expansile in character and was very sensitive on palpation. There was no palpable thrill

or diastolic shock made out. The percussion-note over the most prominent part of the swelling was flat. There was no audible bruit, but a very distinctly accentuated second heart sound was heard over it.

The point of maximum cardiac impulse was not clearly seen nor felt. The sounds were best heard in the fifth interspace 11 cm. from the mid-sternal line. There was distinct visible lifting of the manubrium and slightly also of the sternal end of the left clavicle. There was no apparent increase in the area of cardiac dulness. There was an area of relative dulness over the manubrium, extending from a point in the first right interspace 3 cm. from the median line to a point in the first left interspace 7 cm. from the median line. It extended in a vertical direction to the level of the third rib in the mid-sternal line. There was very slight bulging over this area. A faint diastolic shock was felt over the manubrium. At the point of maximum impulse the heart sounds were audible and practically clear. In the fourth and fifth left interspaces at the sternal border there was a soft diastolic murmur. At the aortic area the first sound was rather rough; the second sound was markedly accentuated and accompanied by a fairly soft diastolic murmur which was also fairly well transmitted down the right sternal border. There was no murmur over the manubrium, but the second sound was of a ringing quality.

The lungs were clear on percussion, excepting over the prominent pulsating tumor in the back. The breath sounds were of equal intensity on the two sides, and were everywhere clear, excepting below the right clavicle, where they had a slight tubular modification.

The abdomen was negative on examination. There were some copper-colored pigmented scars over the left knee and leg.

The patient continued to suffer intense pain during her stay in the hospital, requiring frequent doses of morphin. She was discharged unimproved on August 25, 1901.

Case X.—*Syphilis 18 years before; pain in chest, cough, and dyspnea; left recurrent nerve paralysis; impaired resonance in left interscapular area; hemoptysis; death. Small aneurism of ascending aorta. Aneurism of the first part of the descending aorta projecting into the upper lobe, "which is almost entirely converted into an aneurismal mass;" rupture into pleura.*

A. B. K. (Gen. Hosp. No. 34,676), aged 47 years, colored, waiter, admitted to hospital on May 1, 1901, complaining of shortness of breath, cough, and hoarseness. The family history was unimportant.

The patient had used alcohol in moderation and had smoked a good deal, but had not been a hard worker. He was a heavy eater. Gonorrhea 20 years previously and syphilis 18 years previously.

His present illness began five months before admission, with a cough, which was worse at night and accompanied by an abundant expectoration, in which blood was only noticed on the day before admission. Three months previously he began to be short of breath and had to give up work on account of it one week before. There had been pain in the left shoulder and down the left arm, as well as in the left side of the chest.

On May 2 Dr. Futcher made the following note: Cheyne-Stokes breathing is fairly well marked. There is slight puffiness of the face, huskiness of the voice, and edema of the feet. Percussion is fairly clear throughout the right front. Over the right interscapular region the note is impaired. The breath sounds are tubular below the level of the spine of the left scapula. Moist râles are heard in the subscapular region. The percussion note is impaired

above the clavicle and in the lower axilla on the left side. Synchronous with the impulse in the sixth interspace there is a suggestive retraction in the fourth and fifth interspaces. The second aortic sound is followed by a soft diastolic murmur.

On May 7 Dr. Warfield noted a complete recurrent paralysis of the left vocal cord, with partial paralysis on the right side. No evidence of tuberculosis in the larynx. Two areas of dulness with tubular breathing were noted in the right interscapular region close to the angle of the scapula. There was whispered bronchophony at this point.

On May 8 the patient complained of pain in the left chest. During the night he spat up from 30–40 c.c. of blood, which contained white lumps. No tubercle bacilli were found. The patient died suddenly.

The urine contained a trace of albumin and hyaline casts.

Anatomical Diagnosis (Autopsy No. 1731).—Small aneurism of the ascending arch of the aorta; large aneurism of the descending arch, extending into the left lung; rupture of the aneurism, with hemorrhage into the lung, bronchi, and left pleural cavity; cardiac hypertrophy and dilatation; sclerosis of the tricuspid, mitral, and aortic valves; arteriosclerosis with atheroma of the mitral valve; pale, fatty appearance of all the organs except the kidneys; inequality of the pupils; obstruction of the thoracic duct by aneurism; scar on the penis; syphilitic scars in the liver.

The epicardium is thickened, diffusely over the right ventricle and along the coronaries; the auricles are much dilated and hypertrophied. The aorta is sclerotic and atheromatous. Following up the aorta from the valves, it is diffusely dilated, and on the convexity of the arch just before reaching the innominate there is an aneurism 5 cm. in diameter, nearly filled with old firm clot. Just beyond the origin of the left subclavian artery the aorta becomes inseparably adherent to the upper lobe of the left lung, which is almost entirely converted into an aneurismal mass. This springs from the descending aorta, its mouth being the size of a silver dollar. The aneurism is entirely confined to the lung and is not adherent to the trachea, esophagus, or other structures. Over the pleural surface as well as between the lung and pericardium there are large clots and much fresh blood.

On the convexity of the right lobe of the liver is a slightly depressed scar and on section coarse scars radiating from this into the liver.

The vessels of the kidney are congested; the parenchyma is very pale.

The thoracic duct is pressed upon by the aneurism and much dilated as far down as the mesenteric radicles.

Case XI.—*Syphilis and alcoholism; hard work. Onset with pain in chest, loss of voice, and dyspnea; pulsation in left upper chest in front; tracheal tugging; dysphagia; fulness and pulsation in the left interscapular space; rupture into left pleural cavity. Dilatation of the arch; sacculated aneurism of descending aorta; erosion of third, fourth, fifth, sixth, and seventh vertebræ.*

W. M. J. (Gen. Hosp. Nos. 34,196 and 37,276), aged 46 years, colored, a waiter, admitted to hospital on March 17, 1901, complaining of pain in the chest and back. The family history was unimportant.

Since boyhood the patient had been a steady drinker of whiskey and gin in considerable amounts. He had gonorrhea 14 years previously and syphilis 30 years previously. For two years he had been doing very heavy lifting in the steel works.

The present illness commenced 20 months before admission, the patient being suddenly seized with severe pain in the left chest, the pain being definitely localized in the second and third interspaces, a hand's-breadth from the sternum. The pain was so severe that the patient gave up work. After four days it became less and he went to a physician, who treated him for three months, during which time he had (*a*) constant pain, with paroxysms which were worse at night, the pain shooting to the axilla and left side of the abdomen, as well as to the left interscapular region; (*b*) gastric symptoms, frequent vomiting directly after eating, with irregularity of the bowels; (*c*) loss of voice, almost complete by the end of the three months; (*d*) marked dyspnea, especially on exertion; and (*e*) frequency of micturition, especially at night. The diagnosis of aneurism had been made in the Germantown Hospital. During the past three months the gastric symptoms had been prominent. He had been greatly troubled with constant watering of the left eye. The patient had lost considerable weight.

On March 18 I made the following note: There is a very well-marked, diffuse, heaving impulse over the left upper chest. No tumor is seen. The voice is a little cracked. There is a little more prominence above the left clavicle than above the right, and the left jugular vein is more prominent. The shock of the second sound is very distinct. There is no pulsation in the sternal notch. Tracheal tugging is not seen, but is distinctly felt. The radial pulses are equal. The apex beat is a little out, and is in the fifth interspace. Over the pulsating area there is decided flatness. On auscultation the heart sounds are clear at the apex and there is a loud, ringing, accentuated second aortic. The patient shows the following symptoms: (1) pain, (2) slight cough, (3) change of voice, (4) vomiting, (5) watering of the left eye; and the following signs: (1) diffuse pulsation, (2) tracheal tugging, (3) distended jugular vein on the left side, (4) diastolic shock, (5) impaired resonance. The aneurism is mainly one of symptoms.

On March 18 Dr. Warfield noted a complete recurrent laryngeal paralysis, the left cord being in the median line and motionless.

On April 2 Dr. Futcher made the following note: The patient has had more pain in the left interscapular region for the last few days. There is appreciable fulness and bulging from the level of the fourth to the sixth thoracic vertebræ on the left of the middle line. No visible pulsation. Palpation of this area and of the spines of the fourth to the sixth thoracic vertebræ causes considerable pain. There is no thrill and no audible bruit, but the second heart sound is distinctly heard.

On May 6 the patient was discharged decidedly improved. The urine contained a trace of albumin throughout his stay, and occasionally showed a few hyaline casts.

He was readmitted on December 16, 1901, complaining of intense pain in the chest. Since his previous stay in the hospital he had been temperate and had done no heavy work. For three months previously, however, the old symptoms began to return, and had been accompanied by dysphagia, which had become very intense during the three days previously. The pain at this time was very intense, especially at night, starting apparently under the left scapula and radiating under the arm to the left side of the chest. Aside from this intense pain and the pain of swallowing, the whole chest ached continually. The left arm and the fingers of the left hand ached occasionally and became weak and tired. Cough had not been a prominent symptom. A few days before

admission the left side of the neck was swollen and painful. Since the onset of the dysphagia he had lived on liquid diet. The bowels had been constipated. There had been no hemoptysis.

On December 17 Dr. Cole made the following note: There is marked heaving of the sternum and upper chest, especially on the left side. The clavicles are definitely lifted with systole. A very large area of dulness is present over the front of the chest, but no area of flatness. A soft systolic murmur is heard at the apex and is transmitted outward. Over the second right interspace there is a murmur of great intensity. Slight fulness is seen in the left interscapular space below the spine of the scapula. There is a definite pulsation in this area, most marked 3 cm. below the spine of the scapula. The breath sounds are suppressed over the left supraspinous fossa, but are well heard over the pulsating area.

The leukocyte count was 10,100; hemoglobin 55 per cent.

On December 18 the patient was found exsanguine at 10.45 A.M., with no pulse at the wrist. The heart sounds were very feeble, and percussion over the left chest elicited dulness as high as the fifth rib in the axilla and flatness in the left back. In five minutes the breathing ceased.

Anatomical Diagnosis (Autopsy No. 1836), Dr. Opie.—Aneurism of descending thoracic aorta projecting into left pleural cavity and eroding thoracic vertebræ; rupture into left pleural cavity; second small aneurism of transverse arch of aorta; diffuse arteriosclerosis; chronic pulmonary tuberculosis of upper lobe of right lung; obliteration of right pleural cavity.

The heart is pushed to the right. The left pleural cavity contains 800 c.c. of blood-stained serum and 1800 grams of firm, fresh blood-clot. In upper and posterior portion of cavity is an aneurismal sac, firmly united to the chest wall. The lung is adherent to surface of aneurism.

The heart weighs 410 grams. Muscle firm. Wall of left ventricle 17 mm. thick; of right, 5 mm. Valves normal. Coronary arteries thickened, with a very few patches of sclerosis. Foramen ovale is patent, the orifice measuring 0.5 cm. The aorta above the valve has a very irregular, nodular surface, and there is a diffuse thickening of the intima, with but little sclerosis. The aorta becomes dilated immediately above the valve and at the innominate has a circumference of 12.5 cm., at which level, in the lower and anterior wall, there is the orifice of a small aneurismal sac. The orifice is 16 mm. in diameter, and the sac 2 cm. across; the latter is filled with firm yellow coagulum. The sac lies upon the left pulmonary vein. In the posterior wall of the descending aorta, 3 cm. beyond the left carotid, is the orifice of the large aneurism, projecting into the left pleural cavity. The orifice measures 4.5 cm. across and the sac 10 cm., the latter being partially filled with reddish-yellow coagulum. Within the sac the intima soon disappears, and the wall is formed by the chest wall. Ends of ribs, third to seventh, and the bodies of the thoracic vertebræ, third to seventh, are eroded. The aneurism crosses the middle line and projects into the right pleural cavity. In its outer wall is a rent through which the blood has escaped into the pleura.

The left lung is much compressed. The right lung is bound to the pleura by old fibrous adhesions. Its upper lobe contains numerous fibrous and caseous nodules. One of the bronchi contains miliary tubercles.

The liver shows slight chronic passive congestion.

CASE XII.—*Syphilis, hard work, and alcohol. In 1894 pains in abdomen; for two years cough and recently much pain in the back. Decubitus on right*

side; wide area of impulse in front of chest with wide area of cardiac dulness; tracheal tugging; prominence of left costo-chondral margin. Five admissions. At the second admission pulsation noted in left interscapular region; constant pain; occasional attacks of dyspnea; hemorrhage, death. Dilatation of ascending arch; large saccular aneurism of the descending aorta projecting back and eroding the fifth to tenth vertebræ, with seventh eighth, and ninth ribs; compression and erosion of esophagus.

C. Leonard (Gen. Hosp. Nos. 24,406, 29,677, 30,526, 33,586, 37,393), male, colored, laborer, aged 48 years, was admitted on October 14, 1898, complaining of pain in the back and sides.

The patient's father and an uncle died of tuberculosis. A sister, when a young girl, had suppurating glands of the neck. Otherwise the family history was negative.

The patient had the usual diseases of childhood. There was a history of malaria beginning at the age of nine years and recurring almost annually for a great many years. He contracted syphilis at 17. When a young man he had arthritis of the knee and hip joints which kept him from work for two months. He had been a heavy drinker and smoker. While on a farm he had done hard manual labor. For the last six or seven years he had frequently passed blood in his stools. The frequency of this symptom had gradually increased.

In 1894 he was suddenly seized with an attack of severe pain in the lower part of the abdomen on the left side. He was forced to go to bed, the attack lasting about two weeks. The pain was relieved by flexion of the thighs. These attacks of pain had recurred each year since. They generally came on in the winter, and the patient thought that they were brought on by exposure. More recently he had suffered pain in the back. This was sometimes shooting in character, usually radiating around toward the left flank. The pain gradually became more persistent and severe and he was forced to stop work five days before admission. For the last two years he had had a persistent cough and expectoration.

On admission the patient was a large-framed, well-nourished man. He was a trifle anemic. The pupils were normal in size and equal. The radial pulse was of rather small volume, low tension, synchronous on the two sides, regular in force and rhythm, and 84 to the minute. The patient almost constantly lay on his right side. Turning on his back always increased the pain in the left side of the chest near the costal margin.

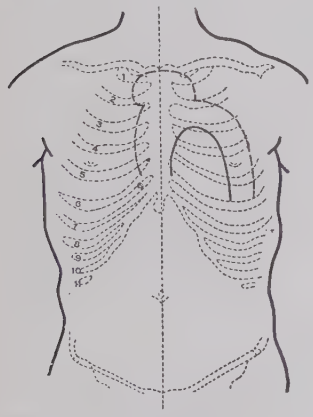
The thorax was somewhat elongated. The costal angle was about 90°. The costal margins, particularly the left, were unusually prominent. On deep inspiration the expansion was appreciably diminished throughout the lower left axillary and subscapular regions. Over these areas also the percussion-note was decidedly impaired and the breath sounds were markedly enfeebled.

On October 22 the following note on the heart was made and the accompanying chart outlined: There is distinct heaving of the whole precordial area. It involves the body of the sternum and extends as far out as the right mammillary line. The lifting is also seen at the base of the sternum and over both sterno-clavicular articulations, particularly the left. The point of maximum cardiac impulse is in the fifth interspace 8.25 cm. from the median line. At this point there is systolic retraction. A distinct wavy impulse is seen in the second, third, and fourth left interspaces. There is slight pulsation in the episternal notch and in the vessels of the neck. In the eighth, ninth, and tenth interspaces below the angle of the left scapula a quite distinct systolic retrac-

tion is seen. Over the fourth and fifth interspaces is felt a distinct systolic thrill. There is a marked diastolic shock over the heart. The relative cardiac dulness begins at the level of the second left rib in the parasternal line. It extends from a point on the fourth rib 3.5 cm. to the right of the median line to a point 12 cm. to the left of the median line on the fifth rib. As seen in Fig. 9, it is continuous with an area of relative dulness over the manubrium. The absolute cardiac dulness begins over the middle of the third left rib and extends from the left sternal border to the point of maximum impulse. There is reduplication of the first sound at the apex, but no murmur. Along the left sternal border in the third, fourth, and fifth interspaces the first sound had a murmurish quality. The second pulmonic is accentuated and reduplicated. The aortic second is loud and ringing in quality. The second sound under the manubrium is very loud and distinct and the first has a slight murmurish quality.

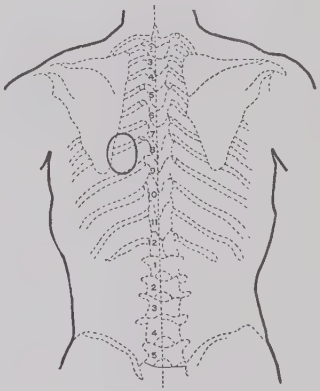
On inspection of the abdomen there was quite marked prominence of the left costo-chondral margin. There was marked tenderness on palpation below

FIG. 9.



Dash line, relative dulness; full line, absolute dulness.

FIG. 10.



Area of visible pulsation.

the margins of the ribs on the left side, where the pain he complained of was always most severe and nearly constant. The muscular resistance was increased on the left side, but no tumor was palpable. The spleen was just palpable, the left kidney was not felt.

On November 5 tracheal tugging was first noted.

Owing to the suggestive signs of aortic aneurism, the patient was started on subcutaneous injections of gelatin. From November 9 to March 14 he received in all 34 injections. The injections usually caused considerable relief from the pain, but otherwise there was no material effect from the treatment. The additional treatment consisted of rest, restricted diet, and potassium iodide.

The patient was discharged on May 2, 1899. From the physical signs presented at this time, a diagnosis was made of aortic aneurism, with adherent pericardium.

From this date to his death, October 25, 1902, the patient was readmitted

four times. In March, 1900, during his second admission, some dulness in the left interscapular region with visible pulsation at the angle of the scapula was observed for the first time. On April 13, 1901, during the patient's fourth admission, I made the following note: When on his right side there is an area of bulging in the left interscapular region opposite the sixth, seventh, and eighth dorsal vertebræ (Fig. 10). It fills up the dorsal groove. There is here a marked, visible pulsation which moves the ribs. The tumor is very painful and there is a little edema of the skin over it. The impulse is very forcible. The second heart sound is heard over the tumor. There is a marked change on sitting up: the pulsation is very much less, but is still visible. There is very little pulsation in the femorals.

From this time it was evident that the patient had an aneurism of the descending thoracic aorta. After his fourth discharge from the hospital on June 3, 1901, he was able to work for six months.

He was admitted for the fifth and last time on December 28, 1901, having been seized two days before with severe pain near the costal margin on the left side. On December 31, 1901, the patient had eight bloody movements. The blood was bright red in color and amounted altogether to about 600 c.c. About this time a skiagraph of the patient's chest was made and a large mass was found to occupy the mediastinum; the portion extending to the right of the median line was believed to be largely heart and that to the left the aneurism.

On January 1, 1902, I made the following note: The character of the precordial pulsation is unlike that seen in ordinary heart hypertrophy. The whole front of the chest is lifted. There is a punctate maximum visible apex impulse in the middle line, but the pulsation is even more marked to the right than to the left of the sternum. From behind the shock of the impulse is noticed in the lower thorax on both sides. The pulsation in the left interscapular region is much more evident in the recumbent posture; not nearly so distinct but still evident in the lower interscapular region while in the erect posture. Over the pulsating area in the back the heart sounds are loud and there is a distinct rough murmur. There is a rough systolic murmur at the aortic area and a rubbing systolic at the lower sternum. Both sounds are loud.

The pain in the back and the lower left side became a very persistent symptom and was often very severe. Morphin was required frequently to alleviate it. While under observation the heaving over the front of the chest gradually became more marked, especially toward the right. On April 17, 1902, the maximum impulse was exactly under the ensiform cartilage. The pulsation in the back gradually increased in distinctness. A thrill was never made out over it. Broadbent's sign in the lower subscapular region persisted. About the middle of August an area of anesthesia to pain, heat, and cold developed at the level of the sixth to the eighth left ribs in the axilla and extending to the front of the thorax. In September dyspneic attacks became more marked and about October 1 difficulty in swallowing was first noticed. For the relief of the pain the patient would go to sleep in a chair with his hands resting on his insteps and his trunk on his thighs.

During the night of October 24 the patient suffered from unusually severe pain and dyspnea. On two occasions without any cough he spat up from 25 to 50 c.c. of bright-red blood. Large doses of morphin, as much as 2.25 grains (0.15) in two hours, were given without material diminution of the pain. At

2.15 A.M. on October 25, 1902, the patient brought up fully 500 c.c. of fresh blood and shortly after died.

Anatomical Diagnosis (Autopsy No. 2020), Dr. MacCallum.—Aneurism of descending part of arch of aorta; erosion of vertebræ and ribs; lamellated clot in aneurism; contraction of left bronchus; compression, erosion, and perforation of esophagus; hemorrhage. General arteriosclerosis. Compression of lower lobe of left lung. Displacement of heart; chronic adhesive pericarditis.

As shown in Fig. 5, the heart is much flattened and pushed to the right. The left pleural cavity is obliterated by old adhesions; the right pleural cavity is almost free, but on lifting forward the lung a large round mass is found to be in contact and slightly to the right of the vertebræ. The right ventricle reaches to about 8 cm. to the right of the median line. The pericardium contains a yellow, clear fluid. There are adhesions over the posterior parts of the heart. The adhesions over the left auricle and coronary veins are rather firm.

The left lung is much compressed. It is thinned out over a large mass. The vessels and bronchi are especially flattened out over this mass. The mid-portion of the lung is very densely adherent to the sac. The lower lobe of the lung is completely flattened out over the large sac. The lower lobe is made up almost entirely of vessels and bronchi.

It is found that a large sac measuring 18 x 14 x 9 cm. extends fully 7 cm. to the left of the vertebral column. It is quite firm and is filled with a dense clot, part of which is fresh post-mortem while the remainder, almost filling the sac, is distinctly mural and shows beautifully the islands of Zahn. All of this material can be lifted up. The sac begins just at the descent of the arch, where it lies at the posterior side of the aorta proper. It is really somewhat sacculated, there being a projection both at the top and at the bottom, where the sac leaves the ordinary course of the aorta. That part of the arch which forms the front of the sac is somewhat distended and is extremely sclerotic, even having calcified patches. The ascending portion of the arch of the aorta is also dilated and is extremely sclerotic, and the branches are similarly sclerotic, but to a less extent. The aortic valves are practically normal, and below the aneurism the aorta shows scattered patches of sclerosis which extend down to the bifurcation. Just above the bifurcation there is an extensive pigmented patch, which is somewhat ulcerated. The left bronchus is much depressed in passing over this mass. On dissecting away the sac from the vertebral column, the vertebræ from the fifth to the tenth are found to be eroded, especially on the left side. The intervertebral discs are quite prominent. The seventh, eighth, and ninth ribs are somewhat eroded and left bare. The posterior portion of the sac is of a yellowish-white color. In places it is completely gone and the clot lies directly upon the bone. The clot is very friable and in some places is broken into a somewhat grumous mass.

The esophagus is especially compressed just at the level of the bifurcation of the trachea. At this point it lies directly on the aneurismal sac. Here the wall has become eroded through and there is an opening in the esophagus about 2.5 cm. in diameter, through which no doubt a hemorrhage has taken place. The edges of this aperture are quite ragged and necrotic-looking. The tissue round about is dark grayish-green in color.

The stomach contains a considerable quantity of deeply blood-stained fluid containing a large clot. Nearly a liter of blood-clot was removed from the stomach. The gastric mucosa shows no apparent abnormality.

The duodenum contains a large quantity of bloody fluid. The rest of the intestines, especially the large intestine, is filled with a deeply blood-stained fluid. The intestinal mucosa is deeply blood-stained throughout. Otherwise the intestines are apparently normal.

CASE XIII.—*Shortness of breath and pain in the chest since the summer of 1900; wasting; marked pain in the side; shooting pains through the epigastrium; pulsation at the sternum and over the manubrium and to the left, with slight impairment of the percussion-note; inspection of the back negative; blood in the stools and on three occasions vomiting of blood; diffuse dilatation of the arch; saccular aneurism of the first part, with general dilatation of the remainder, of the descending thoracic aorta; latent ulcer of the stomach.*

R. R. (Gen. Hosp. Nos. 33,961, 35,871, 39,953, 40,503), male, white, aged 43 years, a machinist, was admitted for the first time February 25, 1901, complaining of pain in the left side and back and of shortness of breath.

The only point of interest in the family history was that his father died of "rheumatism" and dropsy.

The patient came to America from Germany when 28. He had served three years in the German army. His occupation as a machinist had subjected him to heavy lifting. Nine years ago he had an attack of acute rheumatism. Numerous joints were involved and the patient was confined to bed for weeks. Had malaria 13 years ago. He had taken alcohol in moderation, drinking two or three glasses of beer daily. No history of gonorrhea or syphilis obtainable.

During the summer of 1900 the patient began to suffer from shortness of breath and pain in the left side of the chest. The pain was severe and increased by exertion. It gradually became worse and later he had pain in the back of the chest. He complained of pain over the abdomen and back while in the recumbent posture and was forced to sleep in the sitting posture. He had been able to do light work until about one week before admission. Since then the pain in the left side and back had gradually increased. He has palpitation of the heart on exertion. Recently he has lost in weight.

On April 26 I made the following note: The patient has a cardiac facies. The cardiac impulse is diffuse, with systolic jar under the right nipple. There is no punctate localized pulsation. The shock is palpable chiefly over the body of the heart, where palpation is painful. The shock of the first sound is well felt. The back is negative on inspection. The tracheal tug is absent. There is an apex systolic murmur. There is an aortic systolic murmur of maximum intensity in the second right interspace. At the second left costal cartilage and interspace there is a systolic murmur of entirely different pitch. This murmur is also heard at the left sterno-clavicular articulation.

During the observation of the patient in the hospital it was noted that the left radial pulse was much smaller than the right. On firm pressure over the base of the heart there was a diffuse pulsation. There was distinct impairment of the percussion-note over the manubrium. There was no paralysis of either vocal cord. The breath sounds were a little more feeble on the left than on the right side. On February 27 he had a very severe attack of pain in the left side of the chest. There was intense pain in the left back in the lower dorsal region shooting through into the epigastrium. Morphin alone eventually relieved the pain.

The patient left the hospital on March 13, feeling much better. Although the physical signs were a little indefinite, a diagnosis of aneurism was made. At this time the impression was that the arch of the aorta was involved.

The patient was admitted a second time on August 14, 1901. The physical signs and symptoms had not materially changed. He entered a third time on August 20, 1902. Two days before admission he was seized suddenly with violent pains in the abdomen and legs. That night he fainted, owing to the intensity of the pain. He had a similar attack on the morning of admission. There was still a diffuse visible heaving of the upper sternal region, and there was impairment of the percussion-note. Inspection of the back was negative. The only change in the physical signs worthy of note was the fact that there was now a distinct aortic diastolic murmur.

The last admission was on October 11, 1902. Since he left the hospital the pain had been a very prominent and persistent symptom. It was most severe in the back between the scapulæ, where it was of a dull aching character. In addition he also had pain of a stabbing character in the right side of the chest and in the epigastrium. Several times during the week previous to admission he had noticed blood in his stools.

The patient on admission looked paler than usual and sallow. The blood-count showed a secondary anemia: the red cells were 5,048,000, leukocytes 12,400, hemoglobin 32 per cent. There was always a distinct difference in the blood-pressure in the two brachial arteries: one observation showed a pressure of 118 mm. of mercury in the right and only 64 mm. in the left. He vomited blood on the nights of October 14 and 15; 30 c.c. on each occasion. Both attacks of hematemesis were accompanied by intense pain. The patient's stools became tarry and he gradually became paler. On October 16 the blood-count was as follows: red cells 1,272,000, leukocytes 10,160, hemoglobin 19 per cent.

On October 17 I made the following note: Very much blanched. Pulsation in the second and third right interspaces. Diffuse heave over the manubrium. Nowhere any positive punctate pulsation. No abnormal throbbing in the epigastrium. Moderate distention in lower sternum and over ensiform cartilage. Apex beat in normal situation. No pulsating tumor below ensiform. A loud double murmur in the aortic area; of great intensity and very loud at the lower sternum. No pulsation in back. Breath sounds clear and equal on both sides. No tenderness over the lower dorsal spine.

During the night of October 18 he again complained of a great deal of pain and vomited about 15 c.c. of blood at 2.30 A.M. on October 19. The pain persisted, the pulse gradually became weaker, and he died at 8.50 A.M.

Anatomical Diagnosis (Autopsy No. 2013), Dr. Opie.—General arteriosclerosis; dilatation of the arch of the aorta; saccular aneurism of the descending part, eroding the thoracic vertebræ; thrombosis within the sac. Dilatation of the thoracic aorta; endocarditis of the aortic valves. Gastric ulcer with erosion of an artery; hemorrhage into the stomach and the intestines. Perforation of the stomach with beginning erosion of the pancreas. Fatty degeneration of the heart, liver, and kidneys.

The muscle of the right ventricle of the heart measures 3 mm., that of the left ventricle about 17mm. in thickness. It is firm in consistence and of a pale reddish-brown color. The mitral valve is apparently normal. The aorta immediately above the valve is very irregular and has a nodular appearance; in a few places it is opaque and yellow. On section the intima is found to be considerably thickened. The orifice of the left coronary artery is patent; that of the right is considerably encroached upon by sclerotic patches, so that it is reduced to a diameter of 1.5 mm. The segments of the aortic valves near their free edges are thickened; the semilunar folds are in large part obliterated.

Where the semilunar folds are still preserved, there is thickening around the line of closure.

The aorta immediately above the valve and throughout the arch shows the same irregular thickening, and the intima, which is nodular, contains opaque patches in considerable number. The aorta is very greatly dilated, reaching its maximum about the mid-part of the arch, where it measures 12 cm. in circumference.

From the descending part of the aorta, extending backward on the left side, is a saccular aneurism measuring about 6 cm., opening by an oval orifice 4.5 x 2.5 cm. The sac rests against the bodies of the vertebræ and the ends of the fifth, sixth, and seventh ribs. The sac slightly erodes the bodies of the vertebræ with which it is in contact. It contains firm yellowish clots. In contact with the wall of the sac, only filling a small part of it, is a layer of firm yellow clot. The edges of the aneurismal orifice are rounded and quite smooth. The dilatation of the aorta extends below the aneurism throughout the arch.

The thoracic aorta is somewhat dilated, having a diameter of 7 cm., and shows a number of puckered areas which have the appearance of beginning aneurismal pouches. About four of these occur in the thoracic part, and at their site the wall is distinctly thinned.

Both lungs showed marked edema.

The stomach contains about 500 c.c. of fresh clotted blood of a deep-red color. On opening it, a large eroding ulcer is found situated upon the lesser curvature and posterior wall, with its edge 3 cm. from the pyloric orifice. It has a diameter of about 4 x 6 cm. The edge is quite abrupt and not raised. The base is formed by fibrous tissue, very little indurated. The muscularis appears to be completely eroded. In the base of the ulcer, which is fairly smooth and contains areas of black pigmentation, are exposed a group of lymphatic glands which are enlarged, each about 2 cm. across. At the end of the ulcer toward the pylorus the wall has been completely perforated and the pancreas lies exposed in the base. The lobules of the pancreas, for a considerable distance (about 2 cm.), occupying the anterior surface of the body about one-third its length from the splenic extremity, are dissected free from one another and appear to be very little eroded. The splenic artery, which is thickened, tortuous, and eroded, lies in contact with the base of the ulcer, but appears nowhere to be perforated. The splenic vein is not perforated. The mucosa of the stomach elsewhere is blood-stained, but does not show very noteworthy alterations.

On dissecting the vessels in the neighborhood of the ulcer, it is found that the artery passing along the lesser curvature of the stomach reaches quite half-way across the ulcer. Here it ends abruptly in the base of the ulcer, evidently having undergone complete erosion. The mouth of the vessel is covered by a small coagulum.

CASE XIV.—*Pain in side and shortness of breath. Pulsation in the left interscapular space and over the manubrium and lifting of clavicle; rupture into the left pleura. Aneurism of the upper part of the descending aorta; erosion of the third to seventh vertebræ, almost to the spinal canal; arch atheromatous and dilated.*

J. C. M. (Gen. Hosp. No. 38,516), aged 39 years, white, a tobacconist, was admitted April 9, 1902, complaining of indigestion and of pain and soreness in the left side.

Three of the patient's uncles died of consumption. There is no family history of rheumatism.

The patient had been a healthy man. He had had whooping-cough two years previously. At the age of 17 he had two attacks of gonorrhea, but he denied ever having had syphilis. Before his illness he used alcohol very moderately, but had entirely given it up of late. He used tobacco quite freely. Until two years previously he had been troubled with frontal headache, which was apparently neuralgic, being most severe in damp weather.

Fourteen months before admission the patient began to have attacks of indigestion, accompanied by pain of a dull, pressing character, which at first came on after eating and continued about half an hour, but which had come to be constant. He now felt better with a full stomach. There had been no vomiting. He had always been obliged to use cathartics. Ten months previously he thought he had an attack of pleurisy, and had his wife apply plasters and blisters to the affected area on his left side. His physician, however, said that it was indigestion. Eight months previously he began to have shortness of breath on exertion. This had increased until it was now necessary to sit down after even slight exertion to regain his breath. There had been attacks of smothering when the patient would have to go to the window for air. Over the sixth left rib he had had a sharp burning pain, which radiated down to the costal margin and up into the axilla and shoulder.

On April 12, three days after admission, pulsation was first seen and felt in the left interscapular space, its maximum being at the level of the fifth thoracic spine. On the same day, on examination with the fluoroscope, there was seen a definite pulsating shadow, saccular in form, lying almost entirely to the left of the sternum and nearer the back than the front. There was also a rather heavy vertical shadow to the right of the sternum below the saccular portion.

On April 16 I dictated the following note: Fairly healthy-looking fellow. No distention of the veins. No inequality of the pupils. There is a marked pulsation at the top of sternum; throbbing in vessels of neck; wide-spread, diffuse cardiac impulse as far out as the nipple below. The backs are equal and the respiratory movement is equal. There is no bulging in upper interscapular region. Just below the level of the spine of left scapula, in an area 4 x 4 cm., without much bulging, is a distinct, well-defined pulsation, synchronous with the pulsation in the carotid. On palpation there is a very definite, distinct, heaving pulsation. The pulsation over the sternum is not a distinct, punctate impulse, but is diffuse, accompanied by lifting of the clavicle. There is no thrill. The apex beat is in sixth left intercostal space. The shock of neither sound is felt. There is no tracheal tugging. The note is clear over right side of sternum; a little impaired to left. In aortic region, second right interspace, there is a rough systolic and a loud diastolic murmur, maximum in second and third right interspace, no intensification down the sternum; just heard to left of sternum. Both sounds are well heard at the apex; no murmur. There is a rough systolic in sternal notch; no diastolic over pulsation behind. Both sounds are well heard; no bruit; no special signs of pressure on the lung.

On April 25 the patient complained much less of pain. The maximum blood-pressure in the left brachial is 105 mm. Hg.

On May 2 the maximum blood-pressure in the left brachial was 104 mm. Hg.

On May 14 the aneurism seemed to project much more; the pulsation was more marked behind. The patient's condition was apparently much worse.

On May 15 the patient's temperature has been elevated since yesterday afternoon. The pulse is rapid; respirations rapid but not labored. Examination of lungs shows right side clear; left side clear over upper left front; impairment of note and tubular breathing below third rib in axillary line.

On May 15, 2.30 P.M., patient had some dyspnea; no special cyanosis. Pulse was 120, small in volume, still collapsing. Unusual degree of visible pulsation over the whole thorax. Over upper left front there is distinct tympany down to anterior axillary fold; dulness throughout axilla. Over the left front the breath sounds are harsh, high-pitched; expiration prolonged. There is tubular breathing throughout axilla, with crackling râles at end of inspiration. Left back: tympanitic quality above; dulness below. Well-marked tubular breathing below; modified tubular above. Area of pulsation behind has markedly increased during last forty-eight hours.

The patient sank rapidly during the day. The temperature became subnormal at 8 P.M., and the patient passed into unconsciousness, dying at 9.50 P.M.

Anatomical Diagnosis (Autopsy No. 1917), Dr. MacCallum.—Extreme arteriosclerosis; saccular aneurism of aorta, with rupture into left pleural cavity; compression atelectasis of the lung.

The left pleural cavity is found filled with clotted blood, two liters of clots being removed. At the margin of the vertebral column on the left there can be felt a large mass with a ragged central cavity. The right pleural cavity is obliterated by old adhesions. The pericardium is smooth and glistening. The heart is a little enlarged. The aortic valves are very slightly thickened, but are not incompetent. The other valves are normal. The coronary arteries are slightly sclerotic. The heart muscle is soft and flabby.

The right lung is roughened by old adhesions. The posterior portions are collapsed and completely airless. The left lung, excepting a small portion of the upper lobe, is completely collapsed. Otherwise it is normal in appearance, except for the fact that there is a thin, fibrinous coagulum extending over the pleuro-pericardial surface.

The trachea was not at all compressed.

The esophagus lies between the trachea and the aneurism, but is quite free. From the posterior surface of the aorta there projects a great mass, densely adherent to the apex of the left lung. It is also adherent to the vertebræ, there being deep erosion of the bodies of the third to the seventh dorsal. The intervertebral discs are separated and project in a characteristic way between the deep fissures in the vertebral column. The third, fourth, and fifth vertebræ are eroded almost to the spinal canal, the sixth and seventh less so, and there seems to be a regenerative formation of bone on their anterior surfaces. The ribs on the left side are also eroded through at their juncture with the vertebræ.

The aneurism measures about 8 cm. in diameter, and is for the most part smooth internally, although the walls are nearly everywhere covered with thrombi. In some places it is corrugated by the lines of Zahn. The course of the arch of the aorta is not altered.

The aorta itself is extremely sclerotic, its walls being almost entirely made up of calcified plates. Just above the aortic orifice there is a great widening which reaches almost to the mouths of the vessels.

THE TREATMENT OF CARDIAC AND VASCULAR FIBROSIS; HODGSON'S DISEASE; THE TREATMENT OF ANEMIA; ANEMIC AND VASCULAR MURMURS

A CLINICAL LECTURE DELIVERED AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL

BY REYNOLD WEBB WILCOX, M.D., LL.D.

Professor of Medicine and Therapeutics in the New York Post-Graduate Medical School and Hospital; Physician to St. Mark's Hospital, New York

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GENTLEMEN: I have the opportunity this morning to present to you a very interesting case of arterial degeneration with certain sequential mechanical changes in the heart and arteries that constitute a rather rare but suggestive condition. The patient comes complaining of having had hemorrhages from the lungs. About two weeks ago, toward the end of a hard day's work, he began to spit blood, and continued to do so for some time. About a week ago the hemorrhages recurred, though the amount of blood expectorated was not as great as on the previous occasion. As you may gather from his answers, he is sure that the blood was spat up, not vomited. When it first began to come up he was coughing; the more he coughed, the greater the hemoptysis. He says that the blood had an odd taste, being somewhat sweetish at first, but warm, and what we would call mawkish, perhaps; afterward it became distinctly salty.

His personal history is of interest in the appreciation of his condition. He is a man, forty-seven years of age, who has always worked hard. For four years he has been a motorman on the street railway here in New York. In this connection one must remember that motormen, especially those that have to stop heavily laden cars by hand force alone, are obliged to exert a great deal of muscular force, especially such force as is obtained by fixation of the thoracic muscles. For fourteen years previously he had been a fireman on the elevated railroad. For three years before that he had been a fireman on the Erie Railroad, working especially on freight trains. Needless to say his occupation required him to do considerable hard

work, especially muscular work, in shovelling,—that is, lifting and throwing coals. Such work affects especially intrathoracic pressure.

He says that hemorrhage is the only symptom that he has to complain of. A little inquiry, however, elicits the fact that he has a distinct feeling of discomfort in the upper part of the right side of the thorax, and some palpitation of the heart and shortness of breath when he goes up-stairs. Besides these significant symptoms, he has slight swelling of the feet in the evenings. His appetite is reasonably good, his bowels are regular, and, except for a tendency to take cold easily in the winter-time, he considers himself very well.

Physical examination shows, on inspection, that he has a distinct stoop of the shoulders, such as is not infrequent in hard workers, the stoop being due to an anteroposterior curvature of the spine in the upper dorsal region. The muscles of his shoulder-girdle are particularly well developed and his thorax is well expanded. While the anteroposterior diameter of his chest is much greater than is normal, this is not an example of the barrel-shaped chest of emphysema,—what Niemeyer calls the chest of permanent inspiratory expansion. In the barrel-shaped chest the ribs are not so oblique, nor the interspaces so narrow, as they are in this case. Besides, observation of his breathing shows regular expansion of the chest and not the lifting up of the whole thorax *en masse,* as is common in emphysema. It is evident that the increase in the anteroposterior diameter of the chest is due partly to the curvature of the spine and partly to the undue development of the chest consequent upon hard work.

The pulse is rather slow and hard; the artery is a little thickened. The rise of the pulse-wave is slower than it ought to be, and from the sphygmographic tracing (that is being passed around) you can see that the top is rather flat. Inspection of his thorax shows that the apex beat is a little lower than is normal (in the sixth interspace), and just outside of the nipple-line. Percussion shows that the upper border of heart dulness is normal, and that the heart is not displaced toward the right, since the cardiac dulness can be demonstrated only at the left edge of the sternum, as is normal. It is evident, then, that while there is some enlargement of the heart, this involves mainly the left ventricle.

Auscultation reveals the existence of certain heart murmurs.

Beginning at the apex,—for this is the area where mitral murmurs can be heard best, and these murmurs are the most frequent,—we find that two murmurs can be heard. The order of examination will include auscultation at the aortic cartilage next, then at the pulmonary interspace, and finally at the xiphoid cartilage.

Listening at the apex, we find that just at the time of the apex beat, that is, synchronous with the ventricular systole, there is a murmur. This indicates, as some one has already told me in answer to my question, that we have to do with mitral incompetency. There is also a murmur during the systole of the auricle. This indicates the presence of mitral obstruction. When we listen at the second intercostal cartilage on the right we find that there is a murmur, occurring during the systole of the ventricle, in the aortic region. This indicates that at the time the ventricle is contracting in order to force blood into the aorta, it meets with some obstruction, hence we may say at once that there is aortic obstruction. There is also a diastolic murmur in this region, which indicates that the aortic valves, besides being thickened, are incompetent, incapable of holding back the blood in the arteries,—a condition known as aortic incompetency, or, as I prefer to call it, aortic insufficiency. When we listen over the pulmonary interspace we find that there is an accentuation of the pulmonic second sound. This confirms the idea that the mitral valve is insufficient, and that the leaking of blood back into the lungs causes high blood-pressure in the pulmonary system,—whence increased pressure is brought to bear upon the pulmonary valves with the resultant audible snap or click. When we listen between the insertions of the sternocleidomastoid muscles, we are able to catch the aortic sounds even better than over the second right costal cartilage. It is evident that the aorta itself is roughened, because there is a prolonged whirring sound caused by the flow of the blood-stream, as if over a thickened intima. The pulsation of the aorta is more easily felt in this region than is usually the case, showing that there is something that causes the arch of the aorta to ascend higher in the thorax.

Percussion shows that there is an area of distinct flatness extending from just above the third rib on the right side, upward toward the clavicle, and laterally for at least two inches from the right border of the sternum. This is over an area that is usually perfectly resonant, and it indicates that beneath there is some non-

aërated structure, either solid or containing fluid. We evidently have to do in this case, as we can judge when we bring all the symptoms together, with some enlargement of the aorta. This enlargement affects the beginning of the aorta just where it comes off from the heart. This portion of the main artery of the body is called the *conus arteriosus,* that is, the arterial cone, on account of the shape that it assumes at its origin,—broader where it comes off from the heart and narrowing very shortly to the normal lumen of the aorta. This enlargement or dilatation of the *conus arteriosus* is sometimes known as Hodgson's disease, from the English observer who first described it. It has nothing to do with Hodgkin's disease, a disease characterized, as you may remember, by general enlargement of the lymphatic glands throughout the body.

Hodgson's disease occurs characteristically in individuals who for long years have engaged in severe muscle exertion. It is especially likely to occur in those who do their hard work, such as lifting and the like, while the breath is held. The strain put upon the thorax, and the increase of intrathoracic pressure occasioned by withholding the breath in order to afford a *point d'appui* for lifting weights, affects the aorta by reason of the variations in pressure to which it is subjected. As the result of the strain, the intima of the aorta degenerates and becomes roughened, giving rise to a decided friction sound when the blood flows over it. This is the adventitious sound that can be heard so well by listening between the insertions of the sternocleidomastoid muscle, as was first demonstrated by Huchard. The enlargement of the first part of the aorta brings the upper border of the arch of the aorta a little nearer to the stethoscope than under normal conditions, and this facilitates the hearing of this significant sound.

Hodgson's disease occurs, as I have said, in hard workers, in which respect, at least, it resembles aneurism, which, as one of our distinguished clinical authorities here in America has said, is likely to develop in the devotees of the three pagan deities, who are not without many worshippers in our time, Vulcan, Venus, and Bacchus, that is, the god of hard work, the goddess of pleasure, and the god of wine. It must not be forgotten, however, that all hard workers who are much out of doors are likely to take more alcohol than is good for them, and that this dilatation of the *conus arteriosus* may be helped on by the tendency to fibrotic change induced by such

habits. We might expect, then, that aneurism should develop as a consequence of Hodgson's disease. Although I have had at least ten cases of the disease under observation for more than five years, and some of them for more than ten years, I have never seen true aneurism develop on the basis of Hodgson's disease.

The sequence of pathologic events in this case was about as follows: First, as the result of the hard work there developed the dilatation of the *conus arteriosus*. The degenerative process then spread to the ventricle and caused some dilatation of that structure, the process being assisted by the fact that the dilatation of the first part of the aorta made the aortic valves incompetent. The dilatation of the ventricle made the mitral valves incompetent, and the degenerative process spreading along the lining of the ventricle involved and caused some curling up of these valves with the consequent development of mitral obstruction. This succession of pathologic conditions accounts for all the physical signs that we now find.

This whole process of heart degeneration, then, began outside the heart. It is not unusual to find such a sequence when the degenerative process begins in the aorta. Usually infectious processes that involve the heart begin at the mitral valves, over which the systemic blood flows from the venous system, to be distributed once more throughout the body. The fact that the blood has passed through the lungs and become loaded with oxygen seems to add to the virulence or the contagiousness of the micro-organisms in the blood stream, since very few affections of the tricuspid valves from infectious diseases are noticed.

At the present moment we are beyond the time when the hypertrophy of the ventricle serves to compensate for the disturbance of the valvular mechanism of the heart. As a consequence of the overwork, fibrotic changes have begun in the ventricular walls and the heart muscle itself is affected; there is already a fibrous myocarditis. The fibrotic changes affect also the lining of the heart, and the valves become more and more warped with time.

The present case is an excellent one from which to draw the lesson of the significance of adventitious sounds heard at the various valves of the heart. I have been accustomed to present several times each year the following scheme, by means of which the diagnostic significance of heart murmurs may be recognized at once, so

that immediately after listening to the various areas indicated,—first the mitral, then the aortic, then the pulmonary, and finally the tricuspid,—the physician may recognize at once the character and site of the lesion or lesions present in the heart.

SIGNIFICANCE OF HEART MURMURS.

Time.	Location.	Cause.
With the auricular systole, A. S.	At the apex.	Mitral obstruction.
	At the xiphoid cartilage.	Tricuspid obstruction.
With the ventricular systole, V. S.	At the apex.	Mitral insufficiency.
	At the xiphoid cartilage.	Tricuspid insufficiency.
	At the aortic cartilage.	Aortic obstruction.
	At the pulmonary cartilage.	Pulmonary obstruction.
With the ventricular diastole, V. D.	At the aortic cartilage.	Aortic insufficiency.
	At the pulmonary cartilage.	Pulmonary insufficiency.

There is no exception to this short table. Two conditions may cause some diagnostic confusion, but they are not exceptions. One of these occurs when a murmur begins at the time of the ventricular diastole and runs through to the auricular systole (V. D. + A. S.). This murmur is heard best at the apex, and is significant of extreme mitral obstruction. It is very rare, since, among twenty thousand heart cases seen here at the Post-Graduate Hospital, not more than half a dozen of these exceptionally long murmurs have been encountered. The other apparent exception occurs when there is a combination of regurgitation through the aortic valves (V. D. element) and obstruction at the auriculoventricular (mitral) orifice (A. S. element). These two elements have separate areas,—aortic and mitral,—at which they can be heard with greater intensity than elsewhere; and, furthermore, the quality of the murmur heard at the two areas is quite different, so that there is evidently a distinct cause for each.

The most interesting question for us is what to do for a patient like this. The dilatation of the *conus arteriosus* is a structural change, and, while it probably will not progress any further, if a reasonable amount of care is taken, on the other hand, it will not be influenced by treatment. There is a beginning fibroid degeneration of the wall of the ventricle. Now, fibrous change is the *bête noir* of physicians and surgeons, and very probably always will be. The occurrence of hemorrhages in the case shows that the heart is failing and that blood is being backed up in the lungs. In order to restore compensation, absolute rest must be insisted on for some

time, and a bland, unirritating diet must be prescribed. In a word, the man must be fed well and must not work hard for at least six weeks.

It is absolutely necessary that the heart in particular should be given a rest. For this, besides the absence of physical exertion, the arterial blood paths must be opened, so that it will be easy for the heart to do its work. To rest the heart, there are no drugs like the nitrites. As soon as the system comes under the influence of the nitrites, the flattened top of the pulse-wave in the sphygmographic tracing will disappear. The reappearance of this characteristic point of the pulse-wave will indicate that the heart muscle is able once more to act effectively, because it is able easily to overcome the lessened resistance offered by the arteries. Personally, I prefer to use an erythrol compound of the nitrites. Usually I prescribe tablets of erythrol tetranitrite, each containing one-tenth to one-half grain (0.006-0.03), and of these I give one every two to six hours.

It must not be forgotten that the effect of the nitrites wears off after a reasonably short time, and that in consequence the dose should be repeated rather frequently. The duration of the effect is judged by the condition of the patient's pulse, and the frequency of administration of the remedy is to be regulated by the actual findings in each individual case. There are patients in whom, on account of idiosyncrasy, the nitrites act for a much longer time than they do in others.

Two other drugs commend themselves in these cases,—strychnin and iron. Strychnin should be given in rather large doses and almost to its physiologic effect. The dose is not the same for all patients, nor can it be regulated according to the body weight. A twentieth of a grain (0.003) of strychnin nitrate, by the mouth, three or four times a day, is required as a rule; it acts as an excellent muscle tonic, not only increasing the power of the heart muscle, but, by reason of its effect upon the other muscles of the body, it causes them to press the venous blood out of their substance, and thus helps the general circulation and relieves the heart.

Quite as important as strychnin is iron. It is needed to overcome the anemia that always develops in these cases as the result of the disturbance of the blood supply to the blood-making organs. The anemic condition of the blood disturbs the nutrition of the heart muscle itself, and thus a vicious circuit is formed which con-

stantly makes the general condition of the patient worse. Iron may be given in almost any form, but I prefer Blaud's pills, the tincture of the chloride, neutralized with sodium bicarbonate in a syrup, Vallet's mass, or rarely the organic preparations. By increasing the hemoglobin, we increase the oxygen-carrying power of the blood.

Our next patient is a young woman, about twenty years of age, who complains of pain in her heart. By this she means that she has discomfort on the left side of the chest in the cardiac region. She says this is her only symptom, but inquiry elicits the fact that she is short of breath when she goes up-stairs, that her feet swell occasionally, that her appetite is very capricious, and that she is inclined to be constipated. Inspection of her hands and face, and especially of the visible mucous membrane, shows a rather high grade of anemia. The patient really is one of the thin, delicate individuals in whom anemic conditions so frequently develop.

When the stethoscope is placed over the vessels of the neck, just back of the sternocleidomastoid muscle, a distant low pitched musical murmur is heard. This is at once recognized by any one who has ever heard it before as the so-called venous hum. Just what this hemic murmur means is not very well known, but it occurs almost constantly in states of severe anemia. There are two queer names for it, that are rather well known, because of their common use in German and in French medical literature. These are *Nonnengeräusch* and *bruit de diable.* Owing to a misunderstanding, these expressions have been entirely misinterpreted, as a rule. *Nonnengeräusch* means literally "nun's murmur;" and it has been thought to signify that nuns are so frequently anemic that these venous murmurs are very common among them. As a matter of fact, *Nonne,* or the nun, is the name (in German) of a top with which German children frequently play. It is set going by means of a string, and it makes a peculiar buzzing sound. It is because of likeness to this sound that the murmur is called the nun's murmur. The top is called "nun" very probably because of a certain sedateness in its poise when it is spinning at its best, that recalls somewhat the usual quiet demeanor of the nun. The noise has no collateral, or other, reference to the good *religieuse.*

Curiously enough, in French the same kind of top is called *le diable,* "the devil," the idea being perhaps that its power of standing alone represents something more than human. The noise that

the top makes when spinning is called *bruit de diable*. This name has then been transferred, just as in German, to the buzzing sound in the veins of anemic patients. Some who do not appreciate the etymologic significance of the word translate it " a devil of a noise." As a matter of fact, no better expression for the peculiar venous hum could possibly have been given than these metaphoric terms which refer to the top. It is well to remember this, because it gives at once the significance and an excellent idea of what is intended to be conveyed by the term " anemic murmur."

In the present case we can hear, besides the venous hum, a distinct murmur occurring at the time of the systole of the ventricles when we listen over the second intercostal space. There is also a murmur to be heard in the apex region. After a careful study of hemoglobin percentages in nearly two thousand cases, I think that I am in a position to say what the significance of these sounds is. Whenever the hemoglobin of an anemic patient falls below eighty-five per cent., measured either by the Gower's or the von Fleischl instrument,—the latter being a little more exact and the former more convenient,—the venous hum in the vessels of the neck can usually be heard. When the hemoglobin percentage is reduced to sixty-five per cent., the murmur at the second left intercostal cartilage can be detected. Below sixty-five per cent. of hemoglobin there is, besides the two above-mentioned murmurs, a murmur at the apex. These rules are not absolutely accurate, but they form an excellent guide for the study of the extent of the anemia and the lack of hemoglobin in most cases.

When the heart sounds are listened to in this case, the first heart sound is loud and booming in character. This representing the contraction of the ventricle shows that there is a hypertrophy of the ventricle. The fact that murmurs exist indicates that, notwithstanding the hypertrophy, there has been some stretching of the heart muscles from dilatation of its cavities, and that a functional incompetency of the mitral valve has resulted. Stretching of the auriculoventricular ring takes place rather readily in human beings. It has been demonstrated by English investigators that even the auriculoventricular ring of the ox heart, which is composed of cartilage, may be increased eight to ten per cent. in size. It is evident, then, that in human beings even more dilatation than this may easily take place.

As the result of the thinness of the blood, there is a call from all the tissues for more work from the heart, in order that blood may flow through them more rapidly. This leads to the hypertrophy of the ventricle, and then, because the heart's nutrition is lowered by the poor quality of the blood, dilatation occurs. As a consequence of this dilatation we have the murmurs of the various valves. The interesting question in these cases always is, Is the murmur indicative of a functional disturbance or of an organic change? There are two ways to decide the question. The one that is usually employed is to wait until the condition of the blood has been improved by therapeutic measures, and then, if the murmur disappears, we are sure that it was only functional in character. This method may of course take weeks. A more rapid way of gaining the desired information is to dilate the blood-vessels of the body with nitroglycerin, say one-fiftieth of a grain (0.0013) used hypodermatically and followed with one-twentieth grain (0.003) of strychnin; then, if the murmur cannot be heard, it is evident that it was not due to an organic lesion of the heart valves.

In the present case there is every reason to think that the murmurs present are due to the lack of hemoglobin in the blood. It is on this principle that the case will be treated. Iron will be administered, of course, but the diet and hygiene of these patients are extremely important. The patient will be advised to be as much in the open air as possible, yet at the same time to avoid all overexertion. Sunlight is a wonderfully efficient agent in aiding the system to build up its hemoglobin, and iron is always non-effective unless the patient is much out of doors. It must not be forgotten that this substance resembles the coloring matter of many plants which also contain iron, and which only flourish when sunlight is abundant.

Fresh air in the living-rooms and sleeping-rooms of such patients is as important as any other therapeutic measure. It is always desirable that rooms which they occupy for long periods, whether by night or day, should have direct sunlight, for sunlight is the great air purifier and the great natural bactericide, and these people are especially subject to invasion by many forms of bacteria.

As Sir Andrew Clark pointed out many years ago, constipation is a prominent feature in most cases of anemia, and this must be very carefully treated. It is usually habitual constipation and

requires treatment rather by means of the diet than by drugs alone. Patients must be directed to eat solid, nutritious food, such as the cereals and rice and baked potatoes, their digestion aided by diastase with an abundance of cream and butter in order that enough residue may be left to stimulate peristalsis, and gradually establish once more the habit of regular evacuation of the bowels.

The drug treatment of this case will consist in the use of some iron preparation that will be found not to increase the tendency to constipation. Notwithstanding the fact that there is some discomfort in the heart region, some shortness of breath after severe exercise, as on going up-stairs, and murmurs at two of the valves, this is not a case for digitalis, and the administration of digitalis would probably do more harm than good. The indication is for rest rather than for stimulation of the heart.

Among the preparations of iron that I consider especially useful in these cases are those mentioned above. In young individuals the eisenzucker of the Germans is useful. Manganese preparations, when their effect is watched by the hemoglobinometer, are generally disappointing.

NAUHEIM METHODS IN CHRONIC HEART DISEASE WITH AMERICAN ADAPTATIONS

BY THOMAS E. SATTERTHWAITE, M.D.

Consulting Physician to the Post-Graduate Medical School and Hospital, New York; President of the American Therapeutic Society

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Successful practice of the Nauheim system in chronic heart diseases includes the use of carbonated brine baths, resistance and voluntary exercises, with massage; while the diet and general health of the patient should have due consideration. It follows therefore that this method requires the physician's immediate supervision, and that no mere masseur or operator, however skilled in his branch, can be competent to employ it, even if our State laws permitted him to do so.

While the advantages of carbonic acid gas as a therapeutic agent are generally known,[1] because it has been utilized in almost all of the prominent bathing resorts of all countries for a long time, the application of it in chronic heart diseases is a more recent affair. At any rate, so far as we know, it seems to have originated with Beneke, of Marburg, who at one time was the local bath physician at Nauheim. But his claims were modest, for this locality was then chiefly resorted to for gout and rheumatism. Later Oertel, also a physician at Nauheim, elaborated a system that combined baths and general cardiac massage, with graduated hill-climbing as a distinctive feature, so that his method came to be known as the "Terrain Cur." With the death of Oertel his methods fell into comparative disfavor. Later, August Schott, in treating neurasthenics by the Ling system of Swedish resistance movements, found that they stimulated the heart and general circulation. Hence the origin of the "Schott" system.

The Nauheim system of today is mainly the elaboration of the

[1] Dr. A. Rose, of New York, has detailed the methods of using it in impotence, sterility, menstrual affections, pareses, neuralgias, rheumatism, indolent ulcers, and catarrhs.

work of these three men, though the present physicians of Nauheim, such as Groedel, Theodor Schott, and others, have certainly added much to the details of the system, while their large experience has served to define its limitations.

In the year 1897,[1] I began to apply the Nauheim system in chronic heart diseases, using liquid gas and following out Nauheim methods as nearly as I could. But I found it impossible to transplant the system bodily to this country. Modifications to suit our altered conditions were necessary and I propose in the following pages to detail the adaptations made. In the first place, after a few months' trial of liquid gas, I abandoned it for reasons that need not be detailed here, and began generating the gas by a combined use of the acid sodium sulphate and the bicarbonate. This was merely an adaptation of the Hamburg method known as Sandow's. I have generated gas in these two ways for over six years, and thus far without any accident. During this period, carbonated brine baths have also been extensively used in typhoid fever, neurasthenic states, lithemia, and various other affections,[2] and the sphere of their utility is being gradually extended. My experiences, however, have enabled me to define in my own mind with tolerable accuracy both the scope and the limitations of the system, as far as heart diseases are concerned. I cannot preface what I am about to say with anything better than the following sentences: Successful application of the Nauheim system requires the closest attention to details. Disregard of them means miserable failure. The largest success comes from the most careful attention to each apparently insignificant feature.

My methods are as follows: I use mainly, as I have always used, resistance exercises, by which I mean that the patient makes voluntary movements that are resisted by the operator. These movements are quite gentle, and there are intermissions between them. If there should be any weariness on the part of the patient, or if his breathing becomes rapid or pulse rises, a prolonged intermission is given until the equilibrium of respiration or pulse is regained. But there should be an intermission of at least one min-

[1] On January 28, 1897, I read a paper on this subject before the Medical Society of the State of New York.

[2] See Reports by Putnam and Fitz, Boston Medical and Surgical Journal, March 13, 1902; and S. Baruch, Medical Record, January 10, 1901.

ute between each exercise of the series. The operator uses both hands, one supporting the part being exercised, whatever it may be, the other resisting the movement gently but firmly. But the operator's hands in resisting should only grasp the limb or trunk or head with sufficient force to steady it during the required resistance. At the end of each movement the part is restored to its natural position. The resistance should, in every case, be graduated to the patient's strength, and it is here that the experience of the operator comes into play—for his trained hands easily recognize the amount of the patient's strength, as soon as the latter begins the execution of a movement.

During the entire séance the patient should breathe naturally. As a rule each muscle is made to do its work with a gradually increasing force, from the beginning to the end of the course.

The movements themselves are flexion, extension, adduction, abduction, and rotation of the limbs, neck, and trunk. The object of the exercises is to improve the action of the heart and general circulation. The following is the general outline for the first two weeks of an ordinary course: I begin with the passive, that is, unresisted movements, such as with the aid of Dr. H. V. Barclay, I introduced in 1898. They are useful in all cases, but especially in any form of embarrassed respiration and are, in effect, the movements of artificial respiration.

In one variety adapted for women and obese persons the patient lies on his back with the head a little elevated (Fig. 1). The operator then stands at his side, passes his two hands beneath the chest and raises it slowly and gently as far as it will go, without lifting the patient off his bed. The patient should aid the operator slightly by making his respiration coincide with the movements of the operator. One or two natural respiratory efforts should take place between each artificial movement, so that from 8 to 16 are the limits in the two minutes devoted to this exercise. Then the chest is allowed gradually to return to its normal position. With very obese persons two operators may be required. With a folded sheet passed under the back and each operator grasping an end, the procedure can be applied with ease. It is called "chest raising" in distinction from the next named exercise.

The second respiratory movement, which is suited for children and persons of slight build, is shown in Fig. 2. It is called

FIG. 1.—Chest raising. Operator indicated by an X.

FIG. 2.—Shoulder raising. Operator indicated by an X.

FIG. 3.—Forearm flexion and extension. Operator indicated by an X.

FIG. 4.—Leg and thigh flexion and extension—Extension. Operator indicated by an X.

FIG. 5.—Leg and thigh flexion and extension—Flexion. Operator indicated by an X.

FIG. 6.—Thigh flexion and extension. Operator indicated by an X.

FIG. 7.—Trunk flexion. Operator indicated by an X.

FIG. 8.—Trunk extension. Operator indicated by an X.

"shoulder raising." The patient sits on a stool while the operator stands on another behind him. The operator passes his hands over the patient's shoulders in front and grasps him by his armpits; he then lifts the patient's shoulders upward as far as they will go without his being raised from the stool, the patient offering no resistance. As in "chest raising" the patient should aid the operator slightly by making his respiration coincide with the artificial movements of the operator. One or even two natural respirations should be made between each artificial movement, so that from 8 to 16 should be the limit of the artificial movements, in the two minutes devoted to this exercise. After each movement, whether passive or resisted, massage, percussion, or vibration is given first to the extremities and then to the trunk, the foot and leg being first massaged; later the hand and forearm.

The first resistance movement following, after an interval of a minute, is forearm flexion and extension (Fig. 3). The arm of the patient is supported by one hand of the operator applied above the elbow, while the other rests lightly on the patient's hand. The patient now flexes the forearm on the arm to the extreme limit, the operator gently resisting. Then the arm is returned lightly to its place by the operator.

Extension is begun when the forearm is flexed, after the customary interval. The operator still supporting the arm above the elbow, grasps the wrists lightly and resists, while the patient extends the arm, carrying his hand down to the naturally dependent position. Then follows hand and forearm massage which should be light and not prolonged more than two minutes. The next resistance movements are leg and thigh flexion and extension (Figs. 4 and 5). The leg is first extended forward by the patient and then returned to its original position, and after the intermission carried backward. Resistance is given in each case by the operator pressing the open hand against the lower part of the limb. Slight massage of the shoulder and arm for two minutes follows.

The next resistance movements are thigh flexion and extension (Fig. 6). To give this movement most effect the patient should sit on a chair or lounge with his back firmly supported in some way. This position is not only comfortable for the patient, but it enables the operator to use a little more resistance than would otherwise be deemed advisable without disturbing the heart's action.

During any exercise the patient should, if possible, support himself by resting his hand on a chair or some other firm object.

Then follows light chest percussion or flagellation with the tip of the fingers. This movement is particularly useful in chronic heart disease. It appears to aid in contracting the heart[1]—stimulating the respiratory centers through the cutaneous nerves.

The next movements are trunk flexion and extension (Figs. 7 and 8). The patient, placed with his back against the wall and his feet standing out some seven or eight inches, bends his body forward, the operator resisting with one hand over each shoulder-joint. When the body is bent over to form an angle of about forty-five degrees with the wall, the patient erects or extends himself, the operator now resisting with his hands over the scapulas.

The course is concluded by massage of the thigh and back. To each of the exercises in this schedule two minutes are allowed, with intervals of one minute each, so that the length of the entire séance is under 30 minutes. This scheme is applicable for the first two weeks in ordinary cases, and is known in my system as Scheme No. 1.

The following is a brief outline of it:

SCHEME No. 1.

1. Chest lifting—lying or sitting	2	minutes.
Intermission	1	"
2. Foot and leg massage	2	"
Intermission	1	"
3. Forearm flexion and extension	1	"
Intermission	1	"
4. Hand and forearm massage	2	"
Intermission	1	"
5. Leg and thigh flexion and extension	2	"
Intermission	1	"
6. Arm and shoulder massage	2	"
Intermission	1	"
7. Thigh flexion and extension	2	"
Intermission	1	"
8. Chest percussion	2	"
Intermission	1	"
9. Trunk flexion and extension	2	"
Intermission	1	"
10. Thigh and back massage	2	"
Total length of séance	28	minutes.

[1] Abrams, Med. Rec., January 5, 1901.

Fig. 9.—Leg abduction. Operator indicated by an X.

Fig. 10.—Leg adduction. Operator indicated by an X.

FIG. 11.—Trunk rotation. Operator indicated by an X.

FIG. 12.—Arm separation. Operator indicated by an X.

FIG. 13.—Arm opposition. Operator indicated by an X.

FIG. 14.—Quarter-circling. Operator indicated by an X.

FIG. 15.—Trunk flexion laterally. Operator indicated by an X.

During the second and third weeks, the number of exercises remains the same, but a new group of muscles is exercised, and the duration of each exercise is lengthened.

The course begins with chest-lifting, foot and leg massage, forearm flexion and extension, and hand and forearm massage, but in place of leg extension there is leg abduction and adduction—more difficult movements (Figs. 9 and 10). The illustrations show how each movement is made by the patient and how it is resisted by the operator, who, in each case, resists with the open hand pressed against the lower part of the leg.

Then after arm and shoulder massage comes, in place of the trunk flexion of Scheme No. 1, trunk rotation. The method is as follows:

The operator, standing close to the patient, whose feet are firmly fixed, grasps one shoulder with each hand, and assists the patient to turn his body about on its vertical axis as far as possible (Fig. 11). Then the patient untwists himself until he has turned around equally far in the opposite direction. Then the patient slowly assumes his natural attitude.

Chest percussion is then followed by arm separation "the swimming-exercise" (Figs. 12 and 13). The patient holding his wrists parallel carries them backward until in line, the operator resisting, after which the latter returns them easily to their original position. It is not desirable to carry the arm forward with resistance, because such a movement would fix the chest through the action of the pectoral muscles, interfering with natural respiration. During this exercise the patient may stand, sit, or lie down. If he stands, he should brace himself slightly by putting one foot forward. This series ends, as in Scheme No. 1, with thigh and back massage.

The following is a brief epitome of

SCHEME No. 2.

1. Chest lifting—lying or sitting	2	minutes.
Intermission	1	"
2. Foot and leg massage	2	"
Intermission	1	"
3. Forearm flexion and extension	2	"
Intermission	1	"
4. Hand and forearm massage	2	"
Intermission	1	"

5. Leg abduction and adduction	3	minutes.
Intermission	1	"
6. Arm and shoulder massage	2	"
Intermission	1	"
7. Trunk rotation	3	"
Intermission	1	"
8. Chest percussion	2	"
Intermission	1	"
9. Arm separation	3	"
Intermission	1	"
10. Thigh and back massage	3	"
Total duration of séance	33	minutes.

In Scheme No. 2 each of the resistance exercises consumes 2 to 3 minutes and some newer groups of muscles are involved.

In Scheme No. 3, which is applicable for the fifth and sixth weeks, a further change in the series is made, so far as the resistance movements are concerned, and some new ones are introduced that might not be well borne in the beginning of the course—two particularly, "quarter-circling" and "head rotation."

Scheme No. 3 is as follows: After the chest lifting, and foot and leg massage comes "quarter-circling" (Fig. 14). The patient sits on a stool, the operator behind him with one hand on the patient's shoulder in order to fix it, the fingers of the other hand lightly grasping the wrist. The patient's arm being extended downward, it is then carried first upward and forward then downward and backward over a quarter of a circle, the operator resisting. Then after the regulation hand and forearm massage, comes rotation of the head on the neck, or, if it cannot be well borne, simple flexion of the head on the neck. Then follows arm and shoulder massage, trunk twisting, and chest percussion, the last resistance exercises being lateral flexion of the trunk (Fig. 15). The trunk is simply bent on the pelvis laterally, the operator standing in front of the patient and facing him, resisting him as he bends his body well over to one side. One hand of the operator rests on the ribs beneath the axilla, the other on the opposite hip. The trunk having thus been placed in a position of extreme flexion the patient attempts to straighten himself and carry his body over to the other side in extreme lateral flexion. This whole movement from extreme flexion on one side to extreme flexion on the other, is resisted by the operator. By reversing this exercise, there is

another movement, the operator of course reversing the position of his hands. This series ends as usual with thigh and back massage. In brief it is as follows:

SCHEME No. 3.

1. Chest lifting—lying or sitting	2	minutes.
Intermission	1	"
2. Foot and leg massage	2	"
Intermission	1	"
3. Quarter-circling (forward and backward)	4	"
Intermission	1	"
4. Hand and forearm massage	2	"
Intermission	1	"
5. Head rotation or flexion	3	"
Intermission	1	"
6. Arm and shoulder massage	2	"
Intermission	1	"
7. Trunk twisting	4	"
Intermission	1	"
8. Chest percussion	2	"
Intermission	1	"
9. Trunk flexion (laterally)	4	"
Intermission	1	"
10. Thigh and back massage	3	"
Total duration of séance	37	minutes.

It will be noticed that in the final series the exercises involve newer and larger groups of muscles and that all of the great muscles of the body have been exercised. The total duration of the séance is also longer and it is intended that more force should be applied.

By adopting a course such as I have outlined, success will be attained in appropriate cases. Failure in the matter of this part of the treatment is usually due to carelessness in the selection of operators, for on them success is dependent. This topic was well placed before the profession recently by Dr. Victor Neesen.[1] Indeed unless operators have had special training in this branch of their work, success is hardly to be expected, for the method is a peculiar one. Following the Swedish system, many operators are too rapid in their movements. Others fail to observe the required intermissions. Some are over-persuaded by the patients, and allow them to exercise undue force. Others fail to make the patient

[1] New York Medical Journal, May 18, 1901.

breathe naturally. Others blindly follow cast-iron rules, even where it is plainly apparent that from some idiosyncrasy or temporary disability the patient cannot follow the rules in every particular. Perhaps the most common and worst fault is that undue force is used in massage; or the operator disregards the rule that heart cases should have no abdominal massage, unless it is expressly ordered by the physician. So that it has been a public benefit that the attempts of masseurs to practise the Nauheim treatment without medical supervision has been a failure, in this city at least.

Fundamental rules for the operator are:

1. Perform each movement slowly, steadily, and gently.

2. Each single movement is to be followed by a distinct intermission, in which there is entire relaxation of the patient's muscles. It is a good plan to have the patient rest himself in a chair after each movement or series of movements. Double movements should be followed by longer intermissions. In the intermission between the single or double movements the operator should take the pulse and respirations and record them on a slip prepared for the purpose.

3. Movements of the arm should alternate with those of the leg or body.

4. No part of the body should be held so tightly as to compress the blood vessels.

5. The patient should be made to breathe naturally during the séance.

6. The operator should be on the watch for irregular breathing, pallor, or blueness of the lips or face, or any sign of personal discomfort or disturbance on the part of the patient. Upon the advent of any of these signs the exercises must be suspended, for they indicate that there has been too much resistance, or that the movements have been too rapid, or the intermissions too short.

7. In the matter of exercises and massage always err on the side of light and delicate treatment.

There are many movements besides these that have been enumerated. In my first article, I described 38, but physicians now usually limit themselves to a much smaller number. To the present list of 15 double or single movements I sometimes add flexion of the wrist and ankle, making a total of 17 movements. But I now omit all exercises in which the hands are raised above the head,

because the increased resistance thus opposed to the column of blood throws more work on the heart.

A word about massage, percussion, and vibration: They are not only useful in the treatment of chronic heart diseases, but should form a part of any system, though they are less valuable than the exercises and baths. But they are especially useful in lithemic and neurotic patients.

Abdominal massage, however, is prohibited, because in dilated hearts for which this treatment is mainly applied, the liver, spleen, and other chylopoetic viscera are apt to be both swollen and tender, and therefore liable to injury. Besides, as shown by physiologic experiments, abdominal massage tends to inhibit the heart's action. Massage or percussion or vibration is given in the intervals between the voluntary or resistance exercises, largely because it puts a bar upon undue muscular efforts on the part of the patient or operator.

THE BATHS

The course of treatment which lasts from four to six weeks is best preceded by a short period of rest—from two to three days at least, during which the patient's various functions are investigated. At first the baths should be moderately warm and saline; later cooler and more saline; still later mildly effervescent; finally chloride of calcium is added, and the salines and carbonic acid gas increased, while the temperature is decreased.

The duration of an immersion should be from four to fourteen minutes, but no longer. The temperature should not exceed 98° F., nor fall very far below it. Indeed I rarely let the temperature fall below 90° F. Sometimes I do not decrease it more than one degree during the entire course. At first the baths are given with an intermission every third day, later every fourth day, still later every fifth day. On the days of intermission, the physical condition of the patient should be thoroughly looked into. The effect of carbonic acid gas on the skin is that of an irritant (Rose); stimulating with the salines the vasodilators (Baruch).

An artificial Nauheim bath can be improvised in many different ways. Any one who can get sea salt, rock salt, or ordinary bathing salt, calcium chloride, sodium bicarbonate, and muriatic acid, and has at his disposal a wooden, porcelain, or enamelled tub, can so imitate the original Nauheim method as, I believe, to retain its

essential therapeutic qualities. But it has been found, in practice, better to use an acid sodium sulphate in place of hydrochloric acid, and this has been done by the manufacture of solid discs of the acid sulphate, which is readily handled without harm to one's person or clothes. The manufacturers supply the carbonating ingredients in a wooden box about 8 x 6 x 4 inches containing in dry compact form eight discs of the acid sodium sulphate wrapped in heavy lead foil, and four packages of sodium bicarbonate.[1]

In preparing the baths break the discs with a hammer, put them on a plate, and powder them over with the bicarbonate. In about one minute after the ingredients are put in the bath the gas will be liberated.

Both the bicarbonate and the acid sulphate are practically chemically pure. All the water of crystallization has been eliminated from the discs, which contain about forty-two per cent. of free acid. They are hard and do not deliquesce at any temperature, which is important. They keep an indefinite time, but, being hard, dissolve slowly. By this method the evolution of carbonic acid gas is continuous until the tablets are dissolved, and as much carbonated acid gas is given off as there is in an ordinary carbonated bath at Nauheim.

For bathing salt I often prefer to begin with an ordinary American sea salt, as by so doing, I get the benefit of the iodides and bromides they contain, but if this is not important I use a good quality of dairy salt, such as the Genesee. At the end of the first week I carbonate the baths. Then when a large amount of salt is to be used, I substitute ordinary bathing salt for the sea salt, increasing at the same time the amount of carbonic acid gas. When the gas exists in a fair percentage in the bath, its presence is shown by minute bubbles attaching themselves to the body of the bather. At the middle of the course I fortify my ordinary bathing salt with the imported Nauheim Mutterlauge (the so-called concentrated brine salts). By so doing I get the requisite quantity of the calcium chloride for the stronger bath. These imported Nauheim concentrated salts (Mutterlauge salts), contain about seventy-five per cent. of calcium chloride.

An ordinary Nauheim bath contains from two to three and one

[1] Manufactured by the Cassebeer Pharmacal Company, 108 Fulton Street, New York City.

half per cent. of salt, of which eighty-two per cent. is sodium chloride and ten per cent. calcium chloride.

As therefore the imported concentrated salts are rich in calcium chloride, by using the proper proportion of them, we can get at the same time the requisite quantity of the calcium.

My scheme for the ordinary Six Weeks' Course is as follows:

First Week (No. 1 Bath).—One-half per cent. plain warm salt bath. (Two pounds of bathing salt to 50 gallons of warm water.) Temperature, 98° F. Duration four minutes. Intermission on the third and sixth days of this week.

Second Week (No. 2 Bath).—Three-quarters per cent. warm salt bath. (Three pounds of bathing salt to 50 gallons.) One-quarter per cent. carbonic acid gas (two discs to one package). Temperature, 97° F. Duration six minutes. Intermission on the fourth day of this week.

Third Week (No. 3 Bath).—One per cent. warm salt bath. (Four pounds of bathing salt to 50 gallons.) Temperature, 96° F. Carbonic acid gas one-half per cent. (four discs to two packages). Duration, eight minutes. Intermission on the fourth day.

Fourth Week (No. 4 Bath).—One and a quarter per cent. salt bath. (Five pounds of bathing salt to 50 gallons.) Nauheim concentrated brine salts (Mutterlauge salts), eight ounces, or a half a pint of the liquid salts. Carbonic acid gas three-quarters per cent. (Six discs to three packages.) Temperature, 95° F. Duration, ten minutes. Intermission on the fourth day.

Fifth Week (No. 5 Bath).—One and a half per cent. salt bath. (Seven pounds of bathing salt to 50 gallons.) Concentrated brine (Mutterlauge salts), three-quarters of a pint, 12 ounces. Carbonated acid gas, three-quarters per cent. (Six discs to three packages.) Temperature, 94° F. Duration, 12 minutes. Intermission on the fifth day.

Sixth Week (No. 6 Bath).—Two per cent. salt bath. (Ten pounds of bathing salt to 50 gallons.) Concentrated brine salts (Mutterlauge), 16 ounces (one pint) of the liquid salt. Carbonic acid gas, one per cent. (Eight discs to four packages.) Temperature, 93° F. Duration, 14 minutes. Intermission on the fifth day.

It will be noticed that the amount of carbonic acid gas in the bath varies from one-quarter to one per cent.

The number of baths in a full course is 35, but sometimes 20 are sufficient. With robust people it may be well to commence at once with the carbonated brine bath. Sometimes, especially with delicate persons, the Number 4 bath will be as strong as is desirable.

The method of preparing the bath is as follows: Fill the bath-tub—preferably of porcelain or enamelled iron—with 50 gallons of water at about 105° F.; then add the ingredients as follows: first add the required quantity of bath salt, then place the discs of the acid sulphate (broken or pulverized), intermixed with the sodium bicarbonate on a couple of saucers, or on a single plate on the bottom of the tub. An evolution of gas takes place in a minute and lasts 20 or more minutes. The patient should enter the bath when it has reached 98° F., or lower, according to the directions, and remain in it the prescribed length of time. As soon as the gas is evolved it will be seen attaching itself to the trunk and limbs in the form of minute bubbles.

The advantages of the artificial bath may be briefly summarized as follows:

1. It contains the chief natural constituents of the Nauheim waters, and, by the scheme that has been given, is applicable in most chronic heart cases.

2. The carbonic acid gas is held in better solution by the artificial bath than by the natural waters.

3. The artificial bath is cleaner than the natural which contains substances of no obvious utility.

4. The artificial bath is taken at home rather than in a public resort and just before retiring, so that there is little or no danger of catching cold.

5. An artificial bath costs less in this country than in Germany, and the total cost of the treatment brings it within the reach of a moderate purse.

6. There is no danger from free carbonic acid gas, as it is held in closer combination than in the Nauheim waters.

7. These baths can be given at any time of the year.

8. The discomforts of a foreign trip are avoided.

On the other hand there are certain advantages in the Nauheim natural baths.

1. Whatever of virtue there is in the natural waters is retained.

2. The patient has the choice of numerous physicians of repute in the treatment of chronic heart disease.

3. The patient being away from home is for the time entirely freed from many of the annoyances of business, or the cares of private life, in the comparative seclusion of a small watering place, —matters of value in the treatment.

4. He may find the Nauheim course an agreeable feature of a summer jaunt abroad.

Whether it is better to take a course at home or abroad is for each individual to decide after comparing the advantages of one with the other as seen from his special point of view.

THE TREATMENT OF CHRONIC URETHRITIS

A CLINICAL LESSON DELIVERED AT THE VIENNA GENERAL HOSPITAL

BY ERNEST FINGER, M.D.

Extraordinary Professor of Dermatology and Syphilis in the University of Vienna

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GENTLEMEN: You have had the opportunity of seeing many cases of chronic urethritis in our clinic during these last few weeks. We have always more cases of chronic, than of acute, inflammation of the urethra under treatment. While it is often said that gonorrhea is a specific infection and runs a definite course, especially under careful treatment, there is no doubt that many cases of the affection fail to recover entirely, and a persistence of symptoms, though it may be only to a very slight degree, is not an unusual event. When we remember that many cases of gonorrhea are either unskilfully treated, or left almost untreated, or at best receive some slight attention because of the suggestions of friends or apothecaries, it is easy to understand that chronic gonorrhea is a not infrequent ailment.

The importance of chronic gonorrhea has only been realized in comparatively recent times. It has always received much less attention than acute gonorrhea. It was only toward the beginning of the nineteenth century that chronic gonorrhea commenced to arouse the serious interest of physicians. Toward the middle of the century the possibility of the urethral inflammation lasting for a long time was recognized in Germany, though it was not until quite recent years that its true significance was appreciated.

While for a long time the contagiousness of chronic urethritis was doubted, especially when it presents but very few objective and subjective symptoms, as for instance, only a slight morning drop with perhaps a little tingling after there has been overindulgence in alcoholic liquors or some other dietary excess that causes the urine to become irritating, it is now generally recognized that a patient suffering from latent chronic gonorrhea may unconsciously or at least without any intention infect his wife and prove the

source of very serious inflammatory processes in her genital tract. In fact it is generally conceded now that much of the gynecologic work of the present day is necessitated by such unintentional conjugal infection with the gonococcus. It is not impossible that a man having infected his wife should afterward, when in the hitherto unaccustomed tissues of the female the gonococci assume new virulence, be himself reinfected and that this may prove a source of medicolegal difficulties.

It is extremely important then that chronic urethritis should be recognized and that its treatment should be taken up with due seriousness. There is probably no other department of therapeutics, not involving the actual saving of life, in which so much human suffering can be prevented and so much added to the possibilities of human happiness.

The most important warning with regard to chronic urethritis is to be very cautious as to the prognosis. This rule impressed upon the genitourinary surgeon by his experience with acute gonorrhea is emphasized by the extremely dubious and uncertain course of all chronic inflammations of the urethra. It may be said at once that no one can predict when the discharge will cease. Indeed, it may be added that a definite promise of cure cannot always be given. If certain rational principles in the treatment of chronic urethritis are faithfully followed, however, the result is usually not only a symptomatic but an actual and lasting cure. Some years ago surgeons had only a syringe and a certain number of prescriptions for injection at their command for the treatment of chronic urethritis. In nothing, however, has the progress of therapeutics proved more practically helpful by the introduction of new methods of treatment than with regard to chronic gonorrhea. Personally, however, I am convinced that a certain number of cases of chronic gonorrhea are likely to remain incurable notwithstanding the exercise of the greatest care and the employment of all the known therapeutic methods.

Probably the most important factor in the radical cure of a long standing chronic urethritis is patience on the part of the patient. It is indispensable, therefore, from the very beginning to emphasize the necessity of knowing that he must follow directions faithfully a long time in order to secure the radical cure of his urethral lesions. Most patients do not face the situation with sufficient earnestness

and are likely to go from physician to physician without securing any permanent benefit. It is always a mistake then to promise that relief of symptoms or much improvement from treatment will be noticed for some time, and it is always an error to make light of the condition when it is seen for the first time.

Another and almost as serious a factor in the treatment of chronic gonorrhea is that many patients are treated too much. Meddlesome therapeutics surely does more harm than good in many cases of gonorrhea that have passed beyond the acute stage; in many of these cases the symptoms noted are nothing more than evidences of the reaction of the mucous membrane to too long continued treatment by irritating substances. Over treatment is especially likely in cases in which the therapeutic measures are undertaken without any definite object and without knowing the exact indications for treatment in the special conditions present. It is because of the recognition of the indications for treatment that the modern treatment of chronic urethritis has proved effective.

The question of when to begin active treatment is more important than may be thought. Formal therapeutic measures should not necessarily commence as soon as the patient presents himself, but due consideration should be given to his condition. If the case is one that has been neglected for a long time, active treatment along the lines I shall lay down should begin at once. When, however, the patient comes for treatment after having been for a long time and recently—to within a day or two—under the care of another physician, and has been receiving all sorts of astringent or caustic injections, or has been subjected to successive instrumental manipulations, then it would be imprudent if not actually harmful to begin active treatment at once. I cannot warn you too strongly in this matter. There should always be an intermission in local treatment. We must not forget that when treatment, especially with rather irritant medicaments, has been continued for a long while, there is always an irritative condition present, even in healthy portions of the mucous membrane of the urethra. This causes some secretion which of itself may not only disturb the regular course of the symptoms, but may even prove deceptive as to the pathologic condition present.

Personally under these circumstances I always instruct patients to discontinue all local treatment for three or four weeks. During

this time as a placebo and in order to set the patient's mind at rest, I prescribe one of the balsams, such as, the oil of sandal wood, or cubeb, in suitable doses, five drops (0.3) three times a day, or sodium salicylate in correspondingly small doses. At the same time I require the patient to follow implicitly certain directions with regard to his diet and general hygiene. Under these circumstances, it not infrequently happens that a case of urethritis with so much secretion as inevitably to suggest that we have to deal with a chronic diffuse urethritis of recent origin, proves really to be an inveterate form of urethritis thoroughly localized in its pathologic lesions.

One cannot too much insist that the fundamental therapeutic principle to be applied to every case is to begin with mild methods of treatment and only gradually to progress toward those that are severer. This rule holds good for all therapeutic measures, instrumental as well as medicinal, and its violation often means a retardation of the progress of the case that may be sufficient to discourage the patient. Particularly in the use of instruments, no rule of thumb should be followed, but dilatation should always be practised at first with small sizes, and progress toward the use of those of larger caliber should be slow.

In connection with the local treatment of chronic urethritis, in fact as an indispensable adjunct to its successful application, great care must be exercised to get the patient into good general condition. Of late years all specialists have learned to recognize that inflammatory disturbances of mucous membranes seldom can be completely cured unless the normal functions of the individual are in a healthy condition. With regard to the urethra particularly certain functions are of special importance. Care must be taken that regular evacuation of the bowel is obtained, and that the stools are never permitted to become hard so that the patient has to strain. Should constipation not be combated, the tendency to congestion incident on the accumulation of fecal material in the rectum, is almost sure to render abortive all efforts to cure the long standing urethral inflammation.

Hemorrhoids are especially prone to disturb the course of treatment of chronic urethral conditions, and one may often note that there is a certain relation between deterioration in the condition of the hemorrhoids and exacerbation of the urethral symptoms. Frequent lukewarm sitz baths and full baths are an adjuvant of

considerable value in the treatment of these chronic urethral conditions. Personally, I have always found good effects in my patients from sea bathing, especially during the very hot weather.

With regard to the food and drink it is not necessary to insist on as much care as in the case of acute urethritis. Needless to say, however, the diet forms an important part of the successful treatment of chronic urethritis. Indigestible food of all kinds—the indigestibility of food, to a great extent, is an individual matter—should be avoided. Articles of diet that are prone to cause constipation must be avoided. Excess in the use of alcoholic liquors is to be forbidden, but I do not think with some authorities that a limited indulgence in mild liquors, such as wine or beer, should be absolutely forbidden, especially not if the patient has been accustomed to slight indulgence in them during much of his previous life.

A certain amount of exercise is not only to be allowed, but should be recommended. All excess in the matter of exercise, however, should be forbidden. Above all, men must be forbiddeu to ride horseback, or to ride the bicycle; and rowing and gymnastic exercises that affect the perineal muscles must not be allowed.

In conjunction with chronic posterior urethritis certain neurasthenic symptoms are nearly always present. These usually disappear with the amelioration of the symptoms of the urethritis, especially if there is a concurrent improvement in the general health. Not infrequently it is to this sexual neurasthenia that the discomfort associated with urethritis is really to be attributed. There are times, however, when as the result of persistence of the neurasthenic symptoms, there seems to be an irradiation of the nervous irritation to the cord, and in these cases the neurasthenia may require special treatment for itself.

In the treatment of chronic urethritis, the most important consideration is that whatever is done shall not be undertaken on general principles; a careful diagnosis must be made in order to ascertain the exact indications for treatment in the individual case. One of the most frequent symptoms that calls the attention of the patient to the existence of the urethritis is the presence of the morning drop. This expression is very familiar to non-medical people and indicates how general is the idea that chronic gonorrhea may last a long time and yet give very few symptoms. The mere pres-

ence of a morning drop, however, of itself is not absolutely diagnostic of a chronic urethritis.

There are two pathognomonic conditions that must be fulfilled in order to make the morning drop of specific significance: the secretion must contain both pus cells and gonococci. The mere presence of epithelial cells, even in great number, of itself is not indicative of a gonorrheal process. Epithelial secretions may remain after a gonorrhea has run its course and may prove suspicious of a more serious condition, but pus cells are *the* pathognomonic histologic element. Besides the pus cells some gonococci should be found. The absence of gonococci at one or two examinations, of itself is not sufficient to justify a negative diagnosis, but if they continue to be absent the inflammation may be nothing more than a simple irritative condition.

The well-known shreds that appear in the urine in cases of gonorrhea of long standing have a significance allied to that of the morning drop of secretion: they must reveal pus cells and gonococci. If they consist of a number of epithelial cells, and especially if the epithelium is of the flat or transitional variety, it is a sign that the inflammatory process is changing the cylindrical epithelium of the urethral mucous membrane into flat epithelium. A large number of such shreds should suggest a beginning stricture, and should lead to the employing of sounds in order to ascertain the distensibility of the urethra.

The finding of gonococci is not always easy; sometimes though they are present in such numbers as to be detected at once. When they are absent after several examinations notwithstanding the fact that shreds are found in the urine or that a morning drop has been noticed, a certain amount of irritation of the urethral mucous membrane should be deliberately produced in order to determine whether perhaps the gonococci are beneath the superficial layer of cells and in consequence rarely appear in the secretion. As an irritative injection for this purpose I usually use a solution of mercuric bichloride 1 to 500. If there are but very few shreds and a small amount of secretion, I sometimes prefer a solution of nitrate of silver, 1 to 500, which produces free purulent secretion in the pus cells of which gonococci, if present in the case, will almost surely be found.

The examination of the urine is often of great help in making

the diagnosis. For this purpose the morning urine is of more value than any other. The two-glass test is the most important diagnostic method. It is sometimes assumed that all the shreds that appear in the first glass of urine come from the anterior urethra, while those which appear in the second glass show an affection of the posterior urethra. This assumption is erroneous. The principle of the two-glass test is that secretion formed in the posterior part of the urethra flows back into the bladder and becomes mixed with the urine. When, however, the secretion is small in amount and thick this is not the case.

Certain errors may attend the use of the two-glass test and certain precautions must be insisted on. If very little urine is passed in the first glass, then, no matter what the location of the urethritis, all the shreds appear in the second glass. If there has been considerable desire to urinate for some time before urination, as is not unusual when a posterior urethritis is present, then clumps of pathologic material flow back into the bladder and come in the second portion of the urine. If the shreds that appear in the urine are in the form of the hooklets described by Fürbringer, they come always from the prostate gland, and as they are pressed out only when there is a contraction of the prostate at the end of urination, they appear in the second portion of the urine. As a general rule pathological material derived from openings into the urethra, as the seminal vesicles or the various glands, makes its appearance only in the second portion of the urine.

The two-glass test can be made much more exact by irrigation of the anterior urethra. If after irrigation no shreds make their appearance, the inflammation is limited to the anterior urethra. If shreds appear, there is surely a posterior urethritis. The appearance of comma-like shreds is always an indication of involvement of the prostate.

I cannot warn you too frequently to desist from active treatment and the use of instruments for therapeutic and diagnostic purposes in cases in which there is considerable mucous cloudiness of the urine. This is an indication that there is congestion of the mucous membrane and a consequent secretion of mucus in large quantities. To treat such a condition actively is almost surely to aggravate the hyperemia by irritation. The congestion must first be decreased by making the urine as unirritating as possible and by

treating the patient's general condition. The use of the balsams for a week or more and derivation by thorough evacuation of the bowels constitute the best means of securing this.

There are two principal forms of chronic urethritis that require special treatment. First, there is the more recent form in which beside certain limited lesions there are rather large patches of mucous membrane the seat of congestion or passive hyperemia. This condition is recognized by the presence of urethral shreds and an excess of mucus in the urine, causing cloudiness. The second, is the circumscribed form which may exist either in the superficial mucosa or in the submucous tissue. Sometimes this gives rise to inflammatory conditions in the periurethral structures, in the corpora cavernosa or the prostate.

For the first form there are certain rather definite indications that must be met. We must first of all endeavor to overcome the catarrhal symptoms. This is accomplished by means of dilute rather mild astringent solutions which are applied as far as possible to the affected parts until the catarrhal condition is healed. In the circumscribed form stronger astringents and even caustics may be applied directly to the affected parts. When we recall that the lesions lie below the mucous membranes we realize that they must be reached by means of pressure dilatation and the use of resorbents.

If the case be one of chronic urethritis, recent in origin and localized in the anterior urethra, the problem of therapy is not difficult. It is necessary, of course, to have followed the case from the beginning in order to be able to recognize with assurance that such is the condition present. Under these circumstances, I consider that the ordinary instrumental means of diagnosis, the use of the urethrometer, the sound, and the endoscope are not necessary. In fact it seems probable that they may add to the already irritated condition present and perhaps even prove carriers of infection.

For these localized foci of inflammation in the anterior urethra diluted astringents may be injected. For this purpose we may use the ordinary gonorrheal syringe or the larger syringeal apparatus that I have devised. This consists of an apparatus, one filling of which suffices for several injections—the liquid being conveyed to the urethra from it by means of a rubber tube with a suitable tip. One of my favorite injections is as follows:

℞ Zinc sulphate
Acid carbolic
Alum, of each 5 grains 0.3
Distilled water 3 ounces 100.0

The usual routine in these cases is to have the patient use the injections himself, two or three times a day, and every second day to have him call in order that I may make a thorough irrigation of the anterior urethra myself. After the patient has urinated, I insert a strong elastic catheter as far as the bulb and then inject one of the usual solutions. Personally I prefer to use either nitrate of silver in the strength of 1 to 1000, or, if the patient is not very sensitive to this remedy, even 1 to 500; or a solution of potassium permanganate, 1 to 1000. These solutions flow back along the urethra from the end of the catheter and thoroughly wash out the anterior portion of the urethra.

It is my custom during the injection to compress the orifice of the urethra from time to time and in this way to obtain a thorough filling and a certain amount of ballooning of the urethra. This gently forces the medicinal solutions into all the folds and the follicular openings of the urethral mucous membrane. By the use of these remedies a chronic urethritis of the anterior portion will surely be cured and without serious delay. Unfortunately, however, it is rather rare to find the chronic inflammatory process of an old urethritis limited entirely to the anterior urethra. When it is not thus limited, the employment of this method of treatment proves absolutely useless, since other affected portions of the urethra remain untreated.

When localized areas of inflammation exist in the anterior urethra, they may be touched with astringents by means of Ultzmann's brush apparatus. For this purpose many genitourinary specialists employ a solution of nitrate of silver of the strength of 1 to 50, or sometimes even a little stronger. Personally, I prefer to use a solution of copper sulphate, of about the same strength.

Besides the isolated patches in the anterior urethra there may be such inflammatory areas also in the prostatic portion of the urethra. In these cases, the employment of gelatin bougies which are made about five centimeters long and about one-half centimeter in thickness, according to the following formula, will often be found of great service:

℞	Iodoform	10 grains	0.5
	Tannin	4 grains	0.2
	Zinc sulphate	4 grains	0.2
	Copper sulphate	2 grains	0.1
	Silver nitrate	1 grain	0.05

White gelatin, sufficient to make 10 urethral suppositories.

These should be well oiled and should be inserted while the patient is lying down. After the insertion the patients should fix the bougie by the means of the finger, until it softens and its action begins.

Personally for most of these cases I prefer a lanolin ointment. This can be introduced into the urethra to a proper depth by means of a Tommasoli syringe. It should be made up after the following formula:

℞	Creolin, or Silver nitrate, or Copper sulphate	15 to 60 grains	1.0 to 4.0
	Lanolin Vaselin, of each	1½ ounces	50.0

Mix. S.—To be used as a urethral injection.

This ointment which has the advantage of clinging to the mucous membrane, should be introduced into the prostatic portion of the urethra, and if necessary some of it may be allowed to flow into the anterior portion. If ordinary liquid injections or even gelatin or cocoa butter bougies are introduced, all of the remedy is washed out at the first urination. With the use of the lanolin ointment, on the contrary, this does not take place; the pressure exerted by the outflowing urine rather tends to bring the remedy in closer contact with the mucous membrane. Even 36 hours after an injection, portions of the ointment may still be found in the urine. This constitutes then one of the most efficient remedies that we have in urethral therapeutics. With a little care the lanolin can always be kept absolutely aseptic and I have been assured by its inventor, Professor Liebreich, of Berlin, that lanolin itself is always originally an aseptic substance.

When there are isolated areas of inflammation in the posterior part of the urethra with some hypertrophy of the caput gallinaginis, consequent prostatorrhea, and a tendency to spermatorrhea during urination or defecation, I have found that the best remedy is a combination of mechanical and thermic measures with a certain amount

of pressure by the sound. Important accessory remedies are massage of the prostate from the rectum and the use of the cold sound. This last consists of a double catheter with closed ends and a partition so that water flowing into one branch of the forked end, flows through both tubes and out at the other. The catheter is introduced as far as the prostatic portion of the urethra and at first water of about the temperature of the room is allowed to flow through it. Gradually the water is made cooler until after several treatments it is used at about 10° C. (about 50° F.). The treatment is continued for about fifteen minutes each day.

A combination of the treatment by pressure and cold can be secured by having a series of these so-called psychrophore catheters, varying in size from 22 to 30 of the French scale. After the use of this apparatus an injection of a few drops of a strong solution, say three to five per cent. of nitrate of silver, may be made. The combination of mechanical, medicinal, and thermic remedies usually proves very effective even in long standing cases.

Finally we must consider the treatment of the inflammatory process which occurs in the depths of the submucous tissues. This must be treated especially by pressure. If it occurs in the anterior part of the urethra we employ a sound of rather large caliber, beginning with the instruments that will just pass through the pathologically contracted urethra, and gradually using larger sounds until No. 28 or 30 of the French scale is reached. If the infiltration extends rather deeply into the submucous tissues and causes considerable lessening of the caliber of the urethra, the sound may not prove sufficient. Besides it not infrequently happens that the orifice of the urethra is not quite wide enough for the passage of sounds of the necessary size and the patient may object to the cutting of the meatus.

In such cases the use of one of the dilators is the best remedy. Dilatation must be accomplished without force. Patients who are somewhat insensitive may easily be injured more than is necessary; as a rule, blood should not be drawn. If there seems to be considerable connective tissue hyperplasia present it may be necessary to do a urethrotomy, for which Otis's dilating urethotome is the most suitable instrument.

One must not forget that the mucous membrane overlying an area of infiltration is always the seat of a chronic inflammatory

process. Besides pressure then, glycerin solutions or lanolin ointment, containing astringents, should be employed. Personally I prefer to use the latter in the following formula:

℞	Potassium iodide	75 grains	5	0	
	Iodine	15 grains	1	0	
	Lanolin				
	Vaselin, of each	1½ ounces	50	0	Mix.

This salve is well absorbed and acts very favorably not only in cases of chronic local lesions of the anterior urethra but also in the posterior urethral affections, especially those situated near the caput gallinaginis. The injections should be made after a sound has been in the urethra for from 5 to 10 minutes, care being taken that some of the ointment is deposited in the prostatic urethra as well as in the membranous and pendulous portions.

With regard to the contagiousness of chronic gonorrhea, the physician must be extremely cautious in his decision and advice. Until the last twenty-five years, it was the custom generally to deny the contagiousness of the urethritis as soon as the secretion lost its frankly purulent character. Hunter, the distinguished English surgeon, considered that the secretion that gathered during the night and gave occasion to the morning drop was not contagious. Toward the middle of the last century, German physicians began to suspect the possibility of an old urethritis being contagious, and Geigel said that we must not believe too much in the innocence of even the oldest cases of gonorrhea.

The first definite light was thrown upon the subject by Neisser's discovery of the gonococcus, and the aid that this proved in diagnosis. Neisser declared that the contagiousness of chronic urethritis is not absolute but relative, and that it depends on whether gonococci are present or not. He considered that there are old secretions, small in amount, that result from a form of urethritis that contains no gonococci, and are therefore not infectious. Most of the cases of long-standing secretion, however, are contagious despite the fact that it is only after repeated and most careful examination that gonococci may be detected.

Personally I believe that we can allow a man suffering from chronic blennorrhea, by which I mean an individual who has the morning drop or urethral shreds in the urine, to contract marriage only when after daily examination of the secretion for from two to

four weeks we find only epithelial cells and no pus cells. I consider it a duty, however, to suggest irrigation of the urethra with nitrate of silver or sublimate solution in order to determine whether the secretion that is thus provoked is absolutely free from gonococci. I presume, of course, there are no symptoms of stricture or prostatorrhea. The three conditions that I absolutely insist on then before permitting a man to marry, are absence of gonococci, absence of pus corpuscles, and absence of periurethral complications.

While it is possible for the inflammatory condition that persists after an attack of urethritis to be really non-specific in character, to contain no gonococci, and to be consequently non-infective, it is important not to assume that the secretion, however small in amount, is of innocent character,—unless very careful investigations have been made.

I consider that the most important criterion of the non-infectious character of the secretion is the absence of pus corpuscles. So long as pus cells are found, the inflammation is not yet at an end. The search for gonococci is always an extremely difficult matter, and many negative examinations do not afford positive evidence of the non-contagiousness of a given secretion.

Quite recently a number of cases have been reported in which marriage has been followed by infection of the wife, even after many examinations for gonococci by careful microscopists have been futile. Even Neisser has reported a case in which after the use of his method of washing out the urethra with a mercuric solution of the strength of 1 to 10,000 repeated examinations failed to reveal gonococci, and yet the micro-organisms suddenly made their appearance without any ascertainable cause.

I have had two cases under observation myself in which examinations were made repeatedly under varying conditions and with different methods of technic, and always with a negative result, and yet after the dilatation of the urethra, gonococci appeared once more in the secretion. Other observers have had similar experiences, which go to demonstrate that the greatest care must be exercised in permitting marriage on the strength of negative bacteriologic examinations of a urethral secretion. Personally, when I have to decide the question, I make it a rule not to sanction the marriage so long as pus corpuscles, being in the secretion, show that inflammatory changes are still active in the urethra.

THE TREATMENT OF DIPHTHERIA

BY M. HOWARD FUSSELL, M.D.

Assistant Professor of Medicine, University of Pennsylvania; Physician to St. Timothy's and St. Mary's Hospitals, Philadelphia

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The first requisite for successful, intelligent treatment is an accurate diagnosis. In no condition is a diagnosis more frequently inaccurate than it is in the diseases which affect the fauces and nares.

To view every inflamed throat with an exudate as diphtheria is as wrong, though fraught with less harm, as to judge every inflamed tonsil with yellow plugs in the follicles as a simple follicular tonsillitis. It is true that the descriptions of a diphtheritic throat given in the various text-books: a red and inflamed throat with swollen tonsils, accompanied by a grayish-white pseudomembrane which is tightly adherent to the underlying mucous membrane and which when separated leaves a bleeding surface, is in the majority of instances correct. It is equally true, however, that throats presenting an appearance so closely resembling that of a true diphtheria that they may not be distinguished by inspection do not show the presence of the Klebs-Löffler bacillus. It is also true that a throat with inflamed tonsils having an exudate in the follicles which can be easily removed not infrequently gives a pure culture of diphtheria bacillus.

The symptoms of diphtheria and of follicular tonsils so closely resemble each other that they give but little, if any, help in separating the two affections. Therefore neither local signs nor general symptoms are sufficient in some cases for an accurate diagnosis of diphtheria. These are necessarily important, but the pathognomonic sign, that without which a diagnosis is uncertain, is the presence of the Klebs-Löffler bacillus. It is possible to prove the presence or the absence of this organism in the throat by means of a simple culture on a blood-serum tube made at the first visit.

The first requisites for making this culture is a knowledge of what is to be done. This knowledge can be best obtained at a labo-

ratory which exists in practically every large town. Failing this, the proper information can be obtained from any work on clinical bacteriology, such as Abbott's or Mallory and Wright's. Careful and conscientious work will then enable any practitioner to distinguish these organisms. The materials necessary are a blood-serum tube, Löffler's stain, slides and cover glasses, and a good microscope with an oil immersion lens.

When the proper technic is attained the time taken is inconsiderable and much less than is constantly wasted at the bedside. If the physician does not wish to take the time to inform himself of the technic, the examinations can be made for him at one of the various bacteriological laboratories.

The value of the certain knowledge of the nature of the case treated is manifold. Especially is it of use in the hygienic treatment.

Every case of true diphtheria should be carefully isolated and the discharges from the patient destroyed. To take these precautions in a case which resembles true diphtheria, but in which the diphtheria bacillus is absent, is useless and annoying to the family of the patient, while to err on the other extreme and treat an innocently appearing throat as simple tonsillitis though it contain the germ of diphtheria, is to run the certain risk of spreading the disease broadcast through the family if not throughout the neighborhood. A culture should therefore be made in all throat cases either by the physician himself or some one competent to judge of the character of the organisms present.

Prophylaxis.—This phase of the treatment of diphtheria is about as important as the use of medicines. Every case should be isolated at once. Much harm is done and the disease spread broadcast by allowing children with what appears to be a simple sore throat to mingle with their playmates or schoolmates. All such patients should be carefully kept by themselves until a culture proves the presence or absence of true diphtheria.

In treating a well marked case of diphtheria, the patient should be isolated in a room cleared of all unnecessary hangings and furniture. He should be attended by a special nurse or by *one* member of the family. The person in attendance should wear an outside garment and a linen cap which can be thrown off when she leaves the sick room. Both the hands and the face should be thoroughly

cleansed before mingling with the family. All discharges from the nose and mouth of the patient should be received upon small bits of cloth which can be immediately burned. Linen and dishes removed from the sick room should be disinfected by boiling. After the patient has recovered he should be bathed thoroughly and dressed in clothing which has not been in the sick room. The patient should not leave the room until the culture shows the absence of the specific bacillus from the throat. The room should then be thoroughly disinfected.

By observing these very simple rules I have repeatedly been enabled to prevent the disease from spreading even to the immediate family. It is not sufficient simply to give instructions either by word of mouth or by printed directions. At the daily visit the instructions should be enforced.

Antitoxin.—Given a case of diphtheria, the first essential medicinal treatment is the prompt administration of a sufficient dose of diphtheria antitoxin. This remedy should be administered as soon as it can be obtained. Time should not be wasted in waiting for a bacteriological examination. As soon as there is reasonable cause to think that the patient is affected with diphtheria antitoxic serum should be given in full doses.

I have repeatedly observed that a dose of antitoxin given to a patient with a simple sore throat or with follicular tonsillitis does no harm whatever. On the other hand, I have had the unfortunate experience of seeing fatal results when the physician either did not administer the serum or waited "until nothing else could be done." To "wait" is to invite disaster. A few days ago I had the privilege of seeing a case of diphtheria in the fourth week of the disease. The physician first in attendance had not administered antitoxin because he was "afraid of its effect upon the heart." When I saw the patient with another man she was pulseless at the wrist, extremely anemic, her urine was loaded with albumin and tube casts, her left leg was numb and blanched, and there was no pulse felt at the ankle. In twenty-four hours the leg was gangrenous. Treatment with antitoxin was not to be thought of because of fatal visceral changes which had already taken place, and no other treatment was of value. The autopsy showed a thrombus in the popliteal artery. Here was a case in which the well known cardiac degeneration had taken place; in consequence of

this a thrombus had formed not as the result of the administration of antitoxin, but because it had not been administered.

It is the experience of all observers that the antitoxin is harmless. Rotch quotes 4500 cases each of which received one or more doses of antitoxin without a single untoward symptom as the result of the serum.

No one can doubt the value of the remedy who has seen such cases as the following recover as if by magic after its use: The patient was the first to whom I administered antitoxin—a child aged three years with the tonsils swollen, red, and covered with a thick membrane; the glands of the neck were much swollen and indurated, there was a sero-sanguinolent discharge from the nose, the urine contained much albumin and many tube casts; and a pure culture of diphtheria bacilli was obtained from the throat. It was just such a case as usually dies under ordinary treatment. 1000 units of antitoxin were given and in four days the child was practically well. The literature of today teems with such cases. The experience of every man who faithfully uses the serum will be the same,—and yet last month I saw a nurse, to whom antitoxin had not been administered, very slowly recover from a severe case of diphtheria because the physician did not care to administer it unless he was forced to do so.

The dose should be governed by the severity of the attack, and somewhat by the age of the patient. All laryngeal cases and all severe pharyngeal cases should be given 2000 to 4000 units at the first injection. Cases seen later in the course of the disease should receive the larger dose. This dose should be repeated in six or twelve hours if improvement is not manifest. McCollom has used much larger doses with benefit and no ill effects.

I have administered 1000 units to an infant three months old with true diphtheritic croup. The immediate effect of the injection was to cause marked collapse. This passed off in the course of thirty minutes and the child entirely recovered. This, however, was before the time of concentrated serum. The 1000 units administered were contained in 8 c.c. of serum. In all probability it was the bulk of the serum and not the antitoxin administered which caused the collapse.

Concentrated serum should be used whenever practicable,—the pain is much less, and there is much less likelihood of urticaria or

joint pains following its administration. The serum should be administered hypodermically. The syringe and needle should be boiled immediately before being used,—that it may be perfectly sterile. Care should be taken that the syringe be sufficiently cool before the serum is poured in—otherwise coagula will form and occlude the needle. A small needle should be used,—it gives less pain and when withdrawn less serum exudes through the puncture. The site of the injection matters little so long as a spot is selected where there is abundance of connective tissue. I use the back beneath either shoulder blade; others use the inside of the thighs or the abdominal wall. The injection should be made *under* the skin into the connective tissue and the serum should be injected slowly in order that there may be as little violence done to the connective tissue as possible.

I have never seen any inflammatory reaction at the site of the injection. Occasionally, however, it has happened that the skin immediately surrounding the point of injection has become extremely sensitive and painful to the touch. Urticaria and joint pains have occurred, but all of these are trifling incidents rather than complications and call for practically no treatment. Sometimes the temperature will rise one or two degrees after the injection. This is, however, of no importance.

When the patient has received enough antitoxin the temperature will begin to fall, and the pulse will become slower and stronger. If there be any discharge from the nose, it becomes less. The edges surrounding the membrane will become much darker red in color than the inflamed mucous membrane surrounding. This latter I consider the first local sign of improvement; it is soon followed by loosening of the edges of the membrane. In cases of croup without pharyngeal exudate the first sign of improvement is lessening of the harsh breathing and of the dyspnea. Usually the membrane has disappeared and the temperature is normal on the fourth or fifth day of severe cases, and much earlier in mild cases.

Food.—Milk as the most concentrated food should be given from the first. In severe cases it should be combined with whisky or brandy. Where the patient has a desire for food any digestible diet may be used, but one must not be deceived by the seeming good appetite in which less than normal food is taken; therefore, milk should be insisted upon.

Local Treatment.—One of the most satisfactory results of the antitoxin treatment of diphtheria is that it practically does away with local treatment. In cases injected early local applications are unnecessary. If the child is of sufficient age he may use a simple boric acid solution or a normal salt solution as a wash or snuff. In cases seen late, however, the fetor and local destruction demand treatment. By far the best method is irrigation with normal salt solution, a teaspoonful of salt to a pint of water. This may be used in a fountain syringe. All harsh methods, still unfortunately in vogue, should be carefully avoided. I saw a case in which sufficient antitoxin had been administered, but in which little spots of membrane reappeared,—I am sure because wherever these spots were seen they were forcibly detached by means of a swab. Simple cleanliness is all that is necessary even in the worst cases. Antiseptics are of little value; even the much vaunted peroxide of hydrogen seems to irritate the throat unless it was used in the weakest solution.

Medicinal Treatment.—Except in the very mildest cases, those cured by one injection of antitoxin, it is wise to stimulate. Alcohol should be used freely. For a child three years of age two drams (7.5 c.c.) of whisky or brandy may be administered every three hours; later if the heart fails more frequently. Strychnin should be used in doses of one one-hundredth of a grain (0.0006) every three hours to a child of the same age. Digitalis is useful if the heart begins to fail and may be used in doses of three minims (0.18) to a child three years old. Nitroglycerin should be used in collapse in doses of from one three-hundredths to one one-hundredth of a grain (0.0002-0.0006) in a child three years old.

This dose should be frequently repeated—every 15 minutes.

The effect upon the pulse should be watched and when the artery is less full it may be given every hour.

As a routine treatment the following formula has proven of value. It seems to have a beneficial effect locally and acts as a good general tonic:

℞	Mercuric bichloride,	¼ grain	0	015
	Tincture of iron chloride,	2 drams	7	5
	Glycerin,	4 drams	15	0
	Water, sufficient to make	3 ounces	100	0

Mix. S.—One teaspoonful (5 c.c.) every three hours (to a child three years old).

The bichloride in this dose may cause some intestinal distress, and should be lessened in quantity if it does so.

Treatment of Complications.—The most serious complications which occur are cardiac weakness, laryngeal stenosis, nephritis, affections of the eye, anemia, and neuritis.

The most effectual means of combating all these conditions is the very early administration and large doses of antitoxin. In a large number of cases treated with early serum injections not a serious complication has occurred in my experience, but any of these conditions may occur in very severe cases even though they be treated early, and they are pretty sure to occur if the injections are not given until late in the course of the disease.

Cardiac Weakness.—In every severe case there is doubtless more or less change in the heart muscle itself and in the fatal cases grave myocarditis practically always is found at autopsy. It is most important that the heart be examined with the stethoscope daily during the course of the disease. The first change noted is a weakening in the muscular element of the first sound. As the myocarditis advances, the muscular element is almost entirely lost and the first sound becomes valvular like the second sound or it is almost inaudible. With the appearance of this cardiac weakness as denoted by the change in the character of the heart sounds the patient should be kept strictly quiet in bed. He should not be allowed to use a commode for bowel movement or urination, but in its stead a bed pan. He should not be allowed to rise in bed for food, but the nourishment should be given by means of a tube or feeding cup. Just at this time a mixture of iron and strychnin should be given, the following being a favorite combination:

℞	Strychnin sulphate,	$\frac{1}{5}$ grain	0.012
	Solution of iron and ammonium acetate, sufficient to make	3 ounces	100.0

Mix. S.—A teaspoonful (5 c.c.) every fourth hour (to a child three years old).

The strychnin may be increased if the cardiac weakness continues.

If more care were taken to keep the patient quiet we should have fewer fatal syncopes and hear less of death from heart failure in diphtheria.

Laryngeal stenosis is especially amenable to treatment by

large doses of antitoxin even in cases seemingly *in extremis*. 4000 units of concentrated antitoxin will work seeming miracles, as noted in the following case:—

A child four years old was in the sixth day of diphtheria. A stenosis of the larynx developed. I saw him first with marked stridulous breathing and extreme cyanosis. 2000 units of antitoxin were given, and this was repeated twice at intervals of six hours. After the first injection improvement was marked. At the end of eighteen hours the patient was practically relieved and fully recovered without operative interference. When the patient has such a degree of stenosis that death seems imminent, either intubation or tracheotomy should be performed at once—at the time antitoxin is given. In this way the sufferer may be tided over the danger point until the antitoxin can exercise its specific effect. Intubation is to be preferred in the vast majority of cases and will usually be all sufficient. In somes cases, however, tracheotomy must be performed as a secondary operation. The general practitioner should be prepared to do either of these comparatively simple operations. Especially is this necessary in regions distant from a competent surgeon. To wait hours for a surgeon may insure the death of the patient, while immediate interference may save his life.

Albuminuria of mild degree occurs in practically all severe cases and in itself is not a serious symptom. The presence of tube casts, however, shows the advent of a true nephritis. Here care in daily examination of the urine will allow the attendant to foretell of this most serious complication. There is no specific for the nephritis. It is not caused by the antitoxin as proven by large series of cases. When it exists the patient should be forced to take large doses of water and should be kept on a strictly milk diet. In my experience, nitroglycerin is about the only drug which is harmless. It is a mistake to give even digitalis, and the stimulating diuretics are not to be thought of; they will certainly increase the trouble. Nitroglycerin, however, may be given in full doses, one one-hundredth of a grain (0.0006) frequently repeated. Occasionally dry cups over the kidneys followed by a flaxseed poultice will relieve the congestion and thereby do good. It is harmless.

Affections of the Eye.—Diphtheritic conjunctivitis is destructive and the sight may be totally destroyed in a few hours. It is rare in this community. A skilled oculist should be called in attendance

at once. Until his arrival additional antitoxin should be administered, the pupil dilated with atropin, and the eye thoroughly irrigated with sterile boric acid solution.

Anemia exists in the majority of severe cases and should be treated with iron. No preparation is better than the well known Blaud's pills freshly made after the following formula:

℞ Dried iron sulphate,
Potassium carbonate, of each 1 dram 4|0
Mix and make into 24 capsules.
S.—One capsule three times a day.

In some cases the mixture of Basham's mixture and strychnin, already mentioned, may be given with good effect.

Neuritis, the result of the action of the diphtheria toxin, may be relieved by sodium salicylate—more especially the painful forms of neuritis. It may be given in doses of three grains (0.2) three times a day to a child three years old. The paralysis which occurs late and is a consequence of the neuritis is best treated by massage, strychnin, and electricity.

Medicine

PRIMARY INTESTINAL TUBERCULOSIS

A CLINICAL LECTURE DELIVERED AT THE RUSH MEDICAL COLLEGE, CHICAGO

BY FRANK BILLINGS, M.D.

Professor of Medicine in the Rush Medical College (in Affiliation with the University of Chicago), Chicago, Illinois

GENTLEMEN: This boy is seventeen years of age, a Russian by birth, and a cigar-maker by occupation. He was admitted to the Presbyterian Hospital about one month ago. His father, mother, and three sisters are living and well. He says that he has always been healthy until his present illness. He absolutely denies venereal infection. He uses tobacco moderately, but does not use alcohol.

His present trouble began about three weeks before he came to the hospital. For three or four days he felt ill, but he continued his work until he had a very severe chill, when he went home and to bed. The chill was not repeated. He suffered from a very obstinate constipation, and previously to his admission to the hospital his bowels had not moved for five days. At that time he also began to have pain in the abdomen, which has continued ever since. This pain did not appear to be localized very definitely, but was most acute over the lower portion of the abdomen. He has had a continued fever since the chill.

The severe constipation was followed by an almost intractable diarrhea, and finally by almost total incontinence of the bowel. Enough feces constantly escaped to require protection of the bed. When he first came here his bowels would only move when he was given a cathartic or an enema. Eleven days after his admission his bowels moved spontaneously three times—loose, watery stools. Some mucus was mixed with the stool, and to-day he passed some pure mucus. At no time has there been blood observed in the stool. His urine has been negative ever since his admission.

The patient says that following the chill he had a very irregular temperature. This is borne out by the fact that since his admission his temperature has been of a febrile character. In the early morning, on some occasions, it has been subnormal, but usually it is elevated,—anywhere from 100° F. to 102° F. or more. Two days after admission his temperature was 98° F. in the morning, and 101° F. at four o'clock in the afternoon. Nine days ago it was 100.4° F. at ten o'clock in the morning; ten hours later, at eight o'clock in the evening, it ran up to 102.4° F. On the following day his lowest temperature was 99.2° F. and the highest 102.2° F. The variations in the pulse and respiration corresponded with the temperature. Nine days ago his lowest pulse-rate was 88 and the highest 120. The following day the lowest pulse-rate was 92 and the highest 112. During the last few days the temperature has run about as high as before; but the pulse has increased a little in frequency because of the malnutrition and the greater degree of anemia which now exist.

As before stated, the urine is normal. Since the onset of the diarrhea, and since his bowels have become incontinent, there has been retention of the urine, and the bladder has had to be watched and the urine withdrawn with the catheter. This morning, before bringing him in here, I found the bladder distended almost to the umbilicus, and on catheterizing him almost a liter of urine was obtained.

When he first came here we made a very careful examination of his chest, but could not find the slightest evidence of consolidation on percussion. Over the dependent portions of the lungs, however, there were moist râles in profusion. They became more numerous during the next few days and then disappeared entirely. They have not recurred. Whether that had anything to do with his lungs, or whether he had a slight bronchial affection, is a question that is difficult to answer. Probably it had nothing to do with his present trouble.

The blood examination made four days after his admission showed 60 per cent. of hemoglobin, 5,000,000 red cells, and 20,200 white cells—a very marked example of chlorotic blood. The hemoglobin was very low and the red cells practically normal in number. The white cells were increased in number sufficiently for us to say that there was a leukocytosis. Otherwise there was nothing abnor-

mal in the blood. About eighteen days later, or about a week ago, there were found only 3,360,000 red cells (a falling off of over 1,000,000, about 40 per cent. loss in eighteen days), 60 per cent. of hemoglobin, and 14,600 white cells. The leukocytes, you see, were considerably less at this time than at the first counting. There were no abnormal elements in the blood.

The symptoms which he presented were of such a nature that a probable diagnosis of tuberculosis was made, and, because of the condition of his bowels and of the incontinence, the case was regarded as one of tuberculosis of the bowels, although the stools showed no tubercle bacilli upon examination. The diagnosis was looked upon as only a tentative one. In order to prove the correctness of the diagnosis, tuberculin was given. After taking the temperature every two hours, from four o'clock in the morning until ten o'clock at night, for three days, three milligrammes of tuberculin were injected at midnight on the fourth day. At four in the afternoon of the same day his temperature had reached 103.2° F. That was more than a degree higher than his maximum temperature while in the hospital. Then the temperature gradually receded and fell to 99.2° F. by eight o'clock on the next evening. Within from eight to sixteen hours, or sometimes even later, after the tuberculin is given the temperature will rise rather sharply, and to a higher degree in a tubercular patient than the temperature has been running on an average before the tuberculin was given. The temperature remains high for from ten to twelve hours and then recedes gradually. This boy's temperature remained near 103° F. until after twelve o'clock that night, or eight hours later, and then gradually dropped to normal. This very decided reaction to the tuberculin made the diagnosis of tuberculosis absolutely certain.

The two cases in which we have recently had occasion to use tuberculin show conclusively its value as a diagnostic agent. It is of decided value, and, that you might see some of the practical working of it, I used it in this case. Remember, however, when using tuberculin, that it will be almost valueless to you if you do not take the preliminary steps of procuring a two or three hour temperature record for from forty-eight to seventy-two hours before the tuberculin is given. If the temperature is taken only in the morning and at night, or even three times a day, it is insufficient to arrive at a correct temperature standard. Of course, you will

have to miss getting the temperature for two periods at night, as your patient must sleep. Besides, the temperature variations between ten at night and four in the morning are so very slight as to be of little value. But be sure to begin at four o'clock in the morning and take it every two hours until ten at night, that one may secure an accurate record of the temperature curve of that particular time. Then give the tuberculin late at night, either at ten or twelve o'clock, so that the reaction will occur during the daytime, when you may note the slightest change of temperature as compared with the preliminary temperature record of the same hours.

I am sometimes asked, What is a typical reaction? Most authorities agree that a rise in temperature of half a degree is enough. But it is not only the temperature that rises. The pulse also rises, and associated with this the patient has a sense of ill-being, such as muscular soreness. He has an increased amount of infection in the blood, which manifests itself by the so-called tuberculin reaction, represented by a rise in temperature and pulse, increased respiration, fatigue, headache, muscular soreness, and general ill-being.

Now, where is the tubercular lesion in this young man? His whole history of illness points to the abdominal cavity. He certainly has every evidence of it: tenderness over the abdomen and, associated with this, examination of the rectum has shown a loss of power in the external anal sphincter and incontinence as a consequence of it. The incontinence is not as bad as it might be because the mucous membrane of the rectum is very much congested and thickened, so that at a finger's length from the anus the end of the finger hardly passes through the bowel. It is not a stricture, but a swelling of the mucous membrane, which is reddened, swollen, and covered with mucus.

The bladder is not completely empty now. When I place one hand above and the other below it and press down, you can see the bladder rise up between my hands. As one passes the hand over this mass, fluctuation can be distinctly felt. I want you all to follow distinctions of this kind, because once observed they are never forgotten.

The veins of the abdomen are somewhat distended and the abdomen is rather rigid, so that it is difficult satisfactorily to pal-

pate it. The distention is greater over the head of the colon than over the sigmoid and transverse colon. There is much tenderness over the ascending colon and the sigmoid and some pain in the region of the umbilicus. When one palpates carefully over the abdomen, many small hard masses can be felt, and in a patient so thin and attenuated as this boy is, it is an easy matter to recognize these nodules as enlarged mesenteric lymph-glands, which slip from under the fingers very easily. This condition is not like that presented by the omentum, which is sometimes retracted because of peritonitis, and which then presents superficial nodules associated with adhesions and thickening. The mesenteric glands are felt in connection with the bowel as little nodules. The full and distended bladder somewhat obscures them to-day. Here (holding up a small mass) is one that I can move with my hand over to the umbilicus, and when I release it it immediately slips back to its original position. Remember that these mesenteric glands lie in the folds of the mesentery, and will, therefore, slide around the abdomen only as far as the mesentery will let them. These glands have greatly increased in size since our patient came here.

There is apparently no enlargement of the liver and the spleen cannot be palpated. Nothing can be found except these enlarged lymph-glands, the relaxed condition of the sphincter ani, and the swollen mucous membrane high up in the rectum, so thick that it makes a partial obstruction in the bowel and prevents the complete involuntary discharge of feces which would otherwise occur. Repeated examination of the chest during the last ten days fails to disclose anything abnormal. The only thing that is wrong about the urinary apparatus is that the bladder is not always able to evacuate itself, and this is probably due to loss of muscular control, as is the case with the rectum.

We must make a diagnosis in this case by exclusion. With a thin-chested individual like this boy, without cough or other evidence of lung involvement, we can exclude the lung. If there is a focus in the lung, it is so small that it cannot be detected. The bones appear entirely free from any tubercular disease. All of the symptoms point to the abdominal cavity. This patient has never had ascites, however. His symptoms have been referred to the intestines and not to the peritoneal cavity. This, together with the increase in size of the mesenteric lymph-glands, leads us to

make a positive diagnosis of intestinal tuberculosis. These findings are further substantiated by the tuberculin test.

Tuberculosis of the intestine is always ulcerative in character, although it begins as a catarrhal lesion, which, however, does not continue for any length of time. Tuberculosis of the intestine usually results from the tubercle bacillus gaining entrance to the intestinal tract by way of the mouth. The bacillus probably never comes through the blood or lymph stream as in tuberculosis in other parts of the body. In the majority of instances the bacillus gets into the bowel through the swallowing of tubercular sputum. This has been proven experimentally by feeding animals with sputum containing the tubercle bacillus,—this being followed by typical ulcerative lesions in the intestine. The ingestion of tubercular meat or milk containing the tubercle bacillus undoubtedly is also a means of producing this disease.

A short time ago Professor Koch, of Berlin, stated that bovine tuberculosis cannot be transmitted to man. In consequence, many experiments are now being conducted in different places,—in Chicago, Detroit, New York, Brooklyn, Philadelphia, and also in Europe with a view to produce tuberculosis in cattle with the human tubercle bacillus, and also with a view to see whether tuberculosis of cattle is transmissible to man. Professor Vaughan, of Ann Arbor, is now feeding to cattle the sputum of human beings, and also inoculating cattle with human tubercular matter in order to prove that human tuberculosis can be transmitted to cattle.

In all probability the question will be settled in the course of time. Such a positive statement coming from any man other than Dr. Koch would not have been considered for a minute, but coming from him it naturally is of some weight; not weight enough to prevent dispute, but weight enough to make us hesitate in a case like this, in which we have been unable to find tuberculosis elsewhere in the body, and in which we must ask ourselves whether the disease is the result of the ingestion of tubercular meat or milk. We must bear in mind that in spite of the fact that we have at the slaughtering houses inspectors who condemn tubercular animals, some unscrupulous persons are possessed of little enough principle to dispose of these animals as food. We do know, however, that tubercular sputum produces the great majority of cases of tuberculosis of the intestine, and that the disease occurs secondarily to disease

of the lung. Sometimes, of course, such a patient has pain in the bowels and a diarrhea that is hard to check, but occasionally there is no pain at all. On the other hand, we have cases of tuberculosis of the intestine in patients who have not had tuberculosis of the lung, and therefore have no sputum to swallow. It is then a question whether we can get tuberculosis by swallowing tubercle bacilli in milk or meat or by swallowing dust laden with tubercle bacilli.

One of the most prominent symptoms of tuberculosis of the intestine is diarrhea, which is usually moderate, watery in character, and not accompanied by pain. The stools sometimes contain visible amounts of mucus, and sometimes not. The mucus is frequently of the cooked sago-grain kind, which was at one time supposed to be characteristic of the disease. This mucus is supposed to have its origin in the follicles of the intestine, which when inflamed throw out this form of mucus. The mucus is often in strings, looking like coagulated albumin; or it may be mixed with the feces. Visible blood is unusual in the stools, but microscopically blood may always be found in every case of ulceration of the intestine. In cases of ulceration due to typhoid fever or syphilis the blood is sometimes visible in the stools, but in tuberculous ulcers the blood is usually not visible to the unaided eye.

Pain is often present, but it may be entirely absent. This patient has practically no pain, but he has some soreness over the abdomen and sometimes suffers from colic. There is no pain with the bowel movements, although a tuberculous patient usually has some pain with the effort to stool. It is not as severe as the pain of dysentery or chronic enteritis, in both of which there is a great deal of pain and tormina.

Diarrhea is a common symptom, but it may be absent. There may be chronic constipation, especially at the beginning of the trouble. In other words, the ulcers may be latent and the patient exhibit no symptom pointing to their presence, except that the appetite and digestion may not be as good as usual. With the pain and the diarrhea the intestines may be distended with gas, and a good deal of gas may be passed by the anus. There may be disturbances of the stomach, such as nausea and vomiting after eating, and the appetite may be capricious. But these symptoms are common in all stomach and bowel disturbances, and are not characteristic of intestinal tuberculosis.

The spleen, as in other tubercular lesions, may be enlarged, but is not as often enlarged as in tubercular peritonitis. The liver may show tubercular lesions, as it may in all forms of tuberculosis, but the lesion is usually latent. Abscesses may be formed because of the septic condition of the intestine, or thrombosis of the mesenteric veins. But this is an accidental occurrence, and not necessarily a part of the tuberculosis.

The general condition of the patient is the same as in other forms of tuberculosis. Fever and pulse variations are seen as in tuberculosis in any part of the body. In simple tuberculosis of the intestine there is fever, which usually is not high. This man's temperature is unusually high. As a rule, it is subnormal or normal, and then suddenly rises to 101° F. In this case it rose as high as 103° F. Therefore the general condition will depend largely on the existence of tuberculosis elsewhere in the body and not on the intestinal condition. Intestinal tuberculosis is progressive without tendency to heal. If it does heal, it is a very rare occurrence; not as common as the healing of the lung or peritoneal tuberculosis, because the intestines contain infective matter all the time, which does not permit of healing of the intestinal ulcer, and in consequence the tuberculosis spreads.

The lesions usually begin in the solitary and agminated glands, just like typhoid fever. The lymphatic follicles of the ileum or large intestine are infected by the sputum or other infectious material passing through the intestinal canal. Then it attacks the agminate glands, usually selecting the individual follicles in the patch and not the whole patch as in typhoid fever. Next softening occurs, the glands ulcerate, and the contents are thrown out, leaving a dirty base and undermined and excavated edges. The ulcers do not form in the longitudinal axis of the bowel, but in the transverse, oftentimes encircling the entire bowel. If they heal, as they sometimes do, scar tissue remains. This will contract and a stricture of the bowel may result. This condition is never seen in a typhoid ulcer, and at autopsy serves as a means of differentiation between the two.

The tubercular ulcer, because of its progressiveness, usually has a tendency to penetrate deeper and deeper into the bowel—first to the muscular coat and finally to the peritoneal coat. But before the ulcer has reached the peritoneal coat the entire bowel wall has

become thickened and infiltrated. This infiltration can usually be felt, and when it is touched the patient complains of tenderness. In a thick-bellied patient these nodules cannot be felt, but in a thin-bellied person they may be. In this form of ulceration of the bowel perforation rarely occurs. There is, however, a localized peritonitis, which will produce spots of tenderness and adhesions sufficient to cause colic. Inasmuch as such spots of tenderness have not been felt in this patient, such infiltration has apparently not occurred. Mixed infection also occurs at some time in these cases, so that headache, chills, nausea, etc., may occur. This patient sweats severely at night. The process goes on in that way, one spot after another spreading in the intestine, and may extend to the rectum.

Usually the prognosis in these cases is very bad because the disease is progressive. One cannot make a diagnosis of tuberculosis of the intestine unless some tests are carried out. Before the tuberculin test was used so much, I spent days looking through a patient's stools with the microscope for the tubercle bacilli without finding a single one. Sometimes you can make the diagnosis in this way, but it is a tedious process. To-day we have had the first opportunity to examine the typical mucus in this case for the tubercle bacilli. In order to examine the stools for tubercle bacilli, it is best to select the stool that contains mucus. Examine these mucous masses as you would the smears of tubercular sputum. One may make large smears on slides. As a negative test it is of no value, but as a positive test it is of great importance. The difficulty in examining either feces or urine for bacteria is the great dilution of bacteria in these media, so that it may be necessary to prepare and examine a large number of slides before one finds the germ.

Blood may occur in the stool while the tubercular ulcer is infiltrating the tissues of the bowel, but it is rare. This infiltration extends into the blood-vessel, and thrombosis occurs, so that a hemorrhage cannot take place. Hemorrhage is seen frequently in tuberculosis of the lung because the lung is never quiet, and a thrombus forms with difficulty. In a typhoid ulcer of the bowel the infiltration is not so great, and the ulceration occurs so rapidly that when it extends into the blood-vessel hemorrhage takes place before a thrombus may form. Still, the hemorrhage in typhoid fever may be only microscopic.

A follicular ulcer, catarrhal in character, may occur in the intestine just as it occurs in the throat or on the tonsil. It frequently follows an acute enteritis, so that one obtains the history of a cholera morbus or acute diarrhea. Hemorrhage usually does not occur, but considerable mucus is always discharged from the bowel, more than in any other disease, except dysentery. Such an ulcer is located in the small lymph patches and not in the solitary or agminate lymph follicles. They have the same shape as similar ulcers in other parts of the body. Intestinal indigestion is usually the most marked symptom. The disease may be so chronic that the patient will give a history of many years of suffering.

Dysenteric ulcers are seen in chronic dysentery. During the war of the rebellion many of our soldiers suffered from acute dysentery, and to-day you will find many old soldiers who have a chronic diarrhea which has persisted since they were in the war. Many of them are receiving pensions for so-called chronic diarrhea or chronic dysentery. The stools microscopically contain blood and mucus, and they are sometimes very watery and exceedingly painful. The general nutrition is not much disturbed, because the disease is so chronic in character. The nutrition may be below par if there is a very protracted and severe diarrhea.

Dysenteric ulcers are found in the colon and not in the small intestine, whereas those of typhoid fever or tuberculosis may be in either the large or small bowel or both. Dysenteric ulcers sometimes bleed. Typhoid ulcer is first, dysenteric ulcer second, follicular ulcer third, and the tubercular ulcer last as a cause of hemorrhage, but microscopically blood is present in all varieties. If the dysenteric ulcer is low down in the bowel, there may be chronic tenesmus and bearing-down sensations. If the tubercular inflammation passes down into the rectum, there may be tenesmus. This man did not complain of tenesmus when he first came here, but he does so now.

You see, then, that it is very difficult at times to make a diagnosis of the form of ulcer with which one has to deal. But remember that while tuberculosis of the intestine is progressive, it will not last for years, like a chronic diarrhea or dysentery. The differentiation is facilitated by the Widal test in typhoid fever and the tuberculin test in tuberculosis. As the Shiga bacillus is the cause of dysentery, the serum test may enable

us to differentiate dysentery ulcer from other destructive processes in the colon.

So far as treatment goes it is very disappointing, especially when the lesion is situated in the small intestine, for the reason that with twenty-odd feet of bowel it is impossible to get a medication which will have an appreciable effect on the ulcer. If the ulcer is located in the large intestine, we can do much good by means of colonic flushings with plain water and with medicated solutions. Of remedies for intestinal ulcers you will have any number offered. Some clinicians say that bismuth in any of its forms—the subnitrate, subgallate, or subcarbonate, etc.—is of value, because it is said to coat over the ulcer and protect it from a mixed infection. If you can believe that a dose of bismuth will coat over very many ulcers, you have a very lively imagination.

We have many so-called intestinal antiseptics, such as creosote, carbonate of creosote or guaiacol, containing seventy or eighty per cent. of creosote, carbolic acid, or the carbolates or sulphocarbolates, ichthyol, etc., but it will not be necessary to spend our time going over them all. I have the same confidence in them that I have in bismuth. I doubt very much that they have any antiseptic value. So far as I know, there is nothing that can be given by the mouth which will affect the contents of the intestine as an antiseptic which would not kill the patient before enough of the remedy could be given to modify the infection in the bowel. As to the antiseptic of Drs. Novy and Freer, it is an oxidizing product, non-toxic, and said to be perfectly safe. If that is true, it is the only thing that can be given in sufficient dose to act as a bactericide without producing a poisonous effect on the individual.

There is no harm, however, in giving creosote preparations, especially in tuberculosis. You may give the carbonate of guaiacol in five or ten grain doses either in capsule or in milk; or the carbonate of creosote, containing eighty per cent. of creosote, in five or ten or even fifteen drop doses in milk, or the patient may put the drug in an empty capsule when he is to take it; or you may give creosote itself in five or ten drop doses, or, as has been done by some, dilute the creosote with olive oil and give it by the rectum. Or you may give ichthyol in five, eight, or ten grain doses, or naphthol in from one to ten grain doses. You may also give small doses of calomel or of corrosive sublimate, being careful always to withdraw the

drug if it produces any of its characteristic effects on the rectum. None of these will, however, produce an antiseptic effect on the bowel.

I do not say these things to discourage you nor to impress you with the fact that there is no treatment at all for this condition. I say these things in order that you may think about them and reason about them, and that you may not resort to these preparations as specifics, but use them with the possible hope that some good may be done. When I say to you that the tubercular condition goes on and on in spite of all things that you may use, you will understand more clearly what I mean by decrying these much vaunted remedies. Treatment by the rectum may be of value. This patient has great difficulty in retaining fluids because of the condition of his anus. The only thing to do then is to pass a tube high into the colon. Raise the patient's hips and by the force of gravity allow water to flow into the bowel. Because of the incontinence of the sphincter muscle, the water will flow out continuously. If the bowel is continent, the water will be retained, and then these colonic flushings will do much more good. You may use plain water or medicated water. Many different agents are used for medicating the water, bicarbonate or borate of sodium being used to make the solution alkaline. A solution of boric acid or of the so-called intestinal antiseptics, especially carbolic acid and corrosive sublimate, may be used with caution. I have seen three cases of poisoning from the use of corrosive sublimate in the strength of 1-3000. That is certainly very dilute, and one would not think it poisonous, but the susceptibility of some patients is very great. I would not use it in the bowel in a solution stronger than 1-10,000. If you use carbolic acid, remember that patients may also be susceptible to it. The urine may become smoky and reduced in amount, and the patient may even become slightly delirious, and death may ensue. I would not use it stronger than in a 1-1000 solution. Nitrate of silver may cause considerable pain. In the strength of 1-1000 it even produces tenesmus and colic. It is best to begin with a very weak solution and gradually to increase the strength.

In connection with colonic flushings you will have noticed that we often speak of the high rectal tube. A high rectal tube is a soft rubber catheter, a little thicker than the ordinary catheter, and is designed to pass high up in the colon beyond the sigmoid flexure,

even into the transverse colon. I have investigated that matter a great deal, and find that in at least six out of every ten patients in whom the tube is passed it simply passes into the rectum and coils up there. So always investigate this matter. You had better not use it at all than have it coiled up in the rectum, under which circumstances it is worse than useless, and defeats the purposes for which it is intended. When passing the tube into the bowel, it is sometimes wise, as soon as the tube has passed the sphincter, to start the water flowing so as to have a stream of water to make a way for the tube. It is sometimes easier to pass the tube when the patient is placed in the knee-chest position. This position is especially advisable when the rectum is irritable, as it does not require the tube to be in the bowel to any great extent. The water will flow into the colon by force of gravity. I never use the rectal tube until I have investigated the matter of its passage. Unless air is used to distend the tube, or water as I have already described, it will usually not pass, but simply coil up in the rectum. I would therefore strongly urge you always to investigate the position of the tube before the injection is given.

Medicated injections are valuable, but so also is cleanliness. The evacuation of mucus and small masses of feces which lodge on the ulcers removes a source of irritation. The ulcers of chronic dysentery and of typhoid fever may be healed by colonic flushings with plain water, and the tubercular ulcers are certainly not made worse.

Now the question comes up in the use of these flushings, Are they dangerous? I told you that the tubercular ulcer is likely to spread downward into the rectum, so that there may be some danger. But it is so little, and the help given the patient is so great, that I have no hesitancy in disregarding the risk. There is a possible chance of rupture of the bowel, and as a precaution it is best not to give too large an injection. The colon will hold at least four liters of fluid. But it is best to begin with a pint and gradually to increase this to a quart and then to two quarts. Then it may be best to stop, so as not to incur any risk, although as much as four quarts are sometimes used. A woman will not hold so much because her colon is much shorter than that of a man.

A patient like this man should be in the sunshine, and he should have fresh air all the time, just as much as in lung tuberculosis. If

there is any hope for him at all it lies in that direction. Get these patients out of doors as much as possible, even in this northern climate, and keep them there. Let them breathe fresh air. It makes no difference if he has a temperature of 101° F. or 104° F.; bundle him up well, so that he will not feel cold, and put him out of doors. It is not the temperature that acts beneficially in Arizona; it is the fresh air, and one may have good air here.

The discouraging thing in intestinal tuberculosis is that we cannot nourish the patients sufficiently well. Good air and good food are the main things in the treatment of inoperable tuberculosis in any part of the body, and the inability to assimilate good food is very discouraging in intestinal tuberculosis.

As to the curative value of tuberculin and its by-products, I do not know what its value is. The tuberculin first made by Koch seemed to be impure, and in many cases aggravated the process, so that many people died of an acute tuberculosis when the disease for which it was given was chronic. Then, too, the tuberculin was abandoned too rapidly before sufficient trials had been made. The tuberculin products now used are modified tuberculin. Only a very few clinicians use tuberculin now as a therapeutic remedy. It is not an antitoxin, and therefore cannot be considered or used as an antitoxin. Its use in doses sufficiently large to have a curative effect is possibly a little dangerous.

PYLORIC OBSTRUCTION, GASTRIC DILATATION, AND GASTRIC STAGNATION

A CLINICAL LECTURE DELIVERED AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL

BY MAX EINHORN, M.D.

Professor of Medicine in the New York Post-Graduate Medical School; Visiting Physician to the German Dispensary, New York City, etc.

GENTLEMEN: Our first patient this morning is an excellent illustration of the condition scientifically known as ischochymia, that is, failure of the food after its preparation and partial digestion in the stomach to be properly moved on to the intestine. The condition is not so infrequent as is sometimes thought, and its medical treatment, while not as satisfactory as we might wish, is of sufficient importance and is so successful as to make a practical acquaintance with this class of cases very desirable for the general practitioner.

Our patient has been suffering from some digestive disturbance for 15 or 20 years. She is now about 35 years of age and has of late years been rather thin, though at times when she follows directions carefully she gains in weight and is in very satisfactory general health. At the present time and for some years she has suffered from painful attacks accompanied by vomiting that last sometimes for several days and sometimes for a week or more. Then, for several weeks, or at times even for several months, she has a period of comparative comfort. You will not infrequently encounter this kind of attacks, with intervening periods of comparative comfort, in nervous women—especially in those in whom some previous gastric condition has left a pathologic lesion of that viscus.

Our patient's personal history is of interest inasmuch as it points to the organic condition upon which her attacks depend. About four years ago she suffered from a very severe hemorrhage from her stomach. The blood was vomited, not coughed up, and while, at first, it was rather black in color, later it was bright red; and the amount

—a quart and a pint—showed that the case was one of true hematemesis. At that time she was in bed for eight weeks, was fed for the first three weeks entirely by the rectum, and then was given liquid diet until her stomach was in a condition to bear more solid food. She did not increase in weight satisfactorily after her convalescence from this acute illness. At the end of about a year, she had an attack of vomiting and pain, and these attacks have continued to recur at ever shorter intervals, after even slight indiscretions of diet, and they have proved very discouraging. She has lost nearly 40 pounds in weight and has begun to feel that she will never be herself again.

Last week when she was here I showed you that it was possible on inspection to see the waves of peristalsis in her stomach, and that the stomach itself was evidently dilated, inasmuch as its outlines could be traced more or less distinctly on the abdominal wall. The lower border of the stomach came below the umbilicus. The peristaltic waves indicate the existence of the condition known as peristaltic unrest. They occur only when there is some difficulty in the stomach's disposing of the food that is within it. We also found a week ago that though she came to the clinic fasting, having eaten nothing since supper the night before, there were still some portions of food in her stomach, and that besides lactic acid there were some offensive putrefactive products present in the stomach contents. Hydrogen sulphid, in particular, could be demonstrated by holding a piece of paper dipped in acetate of lead over the stomach contents after their removal by the stomach tube. Whenever hydrogen sulphid is present, salts of lead are blackened because the hydrogen is set free with the production of black sulphid of lead.

The diagnosis of the condition present in this case is not difficult from the data at hand. The history of hemorrhage and the after-symptoms point to a gastric ulcer. Her occupation, that of dressmaker, is one of those which is known to predispose to the occurrence of gastric ulcer. It is evident that after the ulcer healed, the cicatricial tissue in the scar contracted and has caused a stenosis of the pylorus. This shutting up of the pylorus prevents the stomach from properly emptying itself. Hence the ischochymia, or stagnation of the stomach contents.

When the patient first came for treatment I washed out her stomach several times, gave her some magnesium and bismuth and

she gradually began to improve. On carefully regulated diet in six months she regained about 30 pounds in weight and was able to take up her occupation of dressmaking regularly once more. It was evident, however, that some food remained in the stomach for a long time after eating and sometimes the vomit would contain food that had been swallowed several days or even a week before. She had to live on very simple food and a mixed diet nearly always caused considerable discomfort.

Finally her condition grew worse again, her attacks became more frequent, and she learned to use the stomach tube for herself, and to wash out her stomach every morning. She was put on a liquid diet and at once began to improve in general health. She used to take two or three quarts of milk a day, and five or six, or even more eggs, usually beaten up in the milk. She gained in weight once more. As long as she kept strictly to her liquid diet her health remained good and her strength was sufficient to enable her to continue at work. Last summer while away from home, she was tempted to some irregularities of diet, among other things she ate some ham and as a consequence her old trouble reasserted itself.

When she was here last week we asked her to limit her evening meal the day before she came back to us to rice and milk, and this morning we shall see how much of this material remains in her stomach now nearly 18 hours after its consumption. She has taken nothing this morning, so that what we shall find is entirely the consequence of stagnation of the stomach contents since yesterday evening.

Before we pass the stomach tube we shall make an examination of her abdomen. By inspection you can see that there is a distinct though slight elevation of the abdominal wall on the left side. The outline of this is the outline of the stomach, as it is pressed against the abdominal wall. The lower border of it reaches down into the left iliac region an inch and a half below the umbilicus. On palpation we are able to detect some fluctuation, and by percussing slightly over the stomach walls are able to elicit splashing sounds that show the presence of liquid within the stomach. Besides this we are able to outline the stomach, more or less distinctly, by percussion, and we are forced to the conclusion that the stomach is distended and contains some fluid.

We first pass the stomach tube and ask the patient to compress her abdomen. We do not get much material, but even in the small quantity that comes there are several raisins. When asked how long since she ate raisins, we find that it is nearly three weeks. This gives you a good idea of how complete is the ischochymia or stagnation of stomach contents as regards solid particles of food. There is some question of the tube being blocked by some of these raisins, so I shall blow through it in order to assure myself that it is free and at the same time to judge by the sound which the entering air makes whether it is bubbling through liquid or not. I find that the tube is free and the patient tells me that she notes the entrance of air into her stomach. There are some sounds resembling bubbling, but these are not very distinct.

We shall now wash out the stomach, in order to obtain its contents more completely. By means of the funnel my assistant pours water into the tube, and after about a pint has been allowed to enter the stomach, the tube is depressed and by its siphon action empties the stomach of its contents. We find several more raisins and some of the rice that was taken last night. There is not as much rice as we expected, however, and this is probably due to the fact that the cereal was very well cooked when taken, in which condition it is in such fine particles that it makes its way out of the stomach almost as does liquid. As a rule it is well to warn patients for the purposes of a test like this not to have the rice cooked too well.

In washing out the stomach in this way you are not always sure of securing particles of food that may cling to the stomach wall, unless there is some churning of the liquid that washes off the particles and causes them to float for a moment so that they will find their way to the opening of the stomach tube. You noticed that in order to secure this movement of the liquid in the stomach, I asked the patient to sway somewhat from side to side and also forward and backward, so as to produce a churning movement of the liquid within the stomach. After this swaying was done the raisins began to find their way out in numbers, though before that we had seen but one. The particles of rice too only began to appear in abundance after this method had been employed to secure their being washed free from the stomach wall.

The presence of the raisins and rice shows that there is true stagnation of the stomach contents even though this is not as complete as

we thought it might prove to be. If we did not already know the reason for this ischochymia, there would be two questions that would naturally occur: Is it due to obstruction of the pyloric orifice, or to relaxation of the stomach walls with the consequent production of a dilated pouch in the greater curvature of the stomach which hangs considerably lower than the gastric exit into the intestine? These two questions include the main causes of ischochymia. It is true that there may be a combination of the two conditions and a stenotic pylorus may lead to a dilatation of the stomach. Usually, however, one of the conditions is primary and always remains the principal factor in the case.

The differentiation of these conditions is not always easy, and yet there are certain diagnostic points that will as a rule enable you to decide with reasonable assurance which of the conditions is present. As a rule, if the stomach contents brought up by gastric lavage consist of thick particles then you must think of obstruction of the pylorus. If the stomach contents are mainly liquid it is rather relaxation of the stomach walls that is the etiologic factor. If the peristaltic unrest that we have noted in this case be present, then the gastric muscle is strong and the attempt to force food out of the stomach through a narrowed pylorus is causing the visible peristalsis. Normally stomach peristalsis is invisible and as might be expected, it is not to be seen when the stomach is much distended and the muscle relaxed and weakened.

If stenosis of the pylorus exists the next important question to be answered is, Is it benign or malignant? The decision of this question is a matter of material significance and must be made as early as possible. If it is malignant then the patient should, as a rule, be given the benefit of an operation. It is possible that all the malignant tissue may be removed and the patient afforded a chance at least for life by radical cure. In any case a malignant stricture of the pylorus indicates the operation of gastro-enterostomy. This will not only save the patient a great deal of pain, by enabling the stomach to pass on its contents and so keep up nutrition, but will also lengthen life by lessening the irritation of the malignant growth and consequently keep it from increasing as rapidly in size as would otherwise be the case.

Fortunately many of the strictures of the pylorus that we see are benignant. The most frequent form of the affection is cica-

tricial contraction of tissue after the healing of a gastric ulcer. Ulcers form especially in the pyloric region and after healing cause puckering of the stomach wall in this region with consequent narrowing of the pyloric orifice. Five per cent. of all the benignant strictures are due to this cause. The other form of benign stricture of the pylorus is due to hypertrophy of the wall of the stomach in this region. The muscle overgrows and narrows the lumen, or contracts and closes it up. Just why this hypertrophy occurs we do not know. But it is clear that some cases of pyloric obstruction are due to this cause.

The most important differential symptom for the diagnosis between benignant and malignant stricture of the pylorus is the length of time over which the history of stomach symptoms extends. If there has been complaint of gastric difficulty for many years then the pathologic lesion is almost without exception benignant. Usually there are periods of intermission during which the patient may be entirely well for six months or a year, but the intervals may not be so long as this and as a general rule the attacks of pain and vomiting get nearer to each other with the progress of the affection. In malignant disease the patient's history of stomach trouble is much shorter, usually not more than six months to a year. During this time too there is a steady progress in the deterioration of the digestive function and of the general condition. There may be, of course, some relief from symptoms for a day or two, or even longer, but there is no real intermission.

The one exception to this rule occurs in those cases in which malignant disease develops on the basis of a previously benign condition, in which, of course, the history of stomach trouble may extend over many years. As is well known, cancer of the stomach develops not infrequently on the base of an ulcer. The fact that an ulcer has been healed and is producing stenosis by cicatricial contraction is no absolute guarantee that the chronic irritation thus set up may not favor malignant degeneration. Among the whole number of cases of ulcer, however, these post-ulcerative cancers are not very frequent. I see a great many cases of ulcer and of cancer, and I may say that in not more than one out of fifteen cases does an ulcer eventually become malignant.

I feel that I cannot insist too much on the diagnostic significance of the length of time in which digestive symptoms have per-

sisted. Personally I place the most reliance on this symptom. There are other symptoms that are of service in making the diagnosis, but I may warn you at once that none of them is nearly so significant as this one and none of them can in any sense be said to be pathognomonic.

Some years ago it was thought that the examination of the gastric contents very early in cases of gastric cancer would enable us to recognize the beginning of malignant disease. As a rule, the free hydrochloric acid disappears from the gastric juice quite early in cancer cases, and as a consequence of its absence lactic acid fermentation makes its appearance. This combination of chemical signs is helpful in making the diagnosis but it cannot be absolutely depended on. There are some cases of cancer of the stomach in which free hydrochloric acid continues to be present until late in the disease. In only about four-fifths of the cases of malignant disease is it constantly absent.

On the other hand, in benign stenosis of the pylorus, as a rule, the hydrochloric acid continues to be present, and this prevents the growth of the bacteria which cause lactic acid fermentation. Under these circumstances it is not unusual to find, if the stomach contents are delayed for a considerable period in the stomach, that the proteid material of the food undergoes fermentation which is really of a putrefactive character. This gives rise to the presence of hydrogen bisulphid in the stomach contents as we have already noticed in the case under observation to-day. There are peculiar not well understood conditions, however, in which even though the gastric disease is due to a benignant lesion, the hydrochloric acid is absent.

Usually in malignant disease a tumor of the stomach can be felt. As a rule this occurs along the lesser curvature of the stomach, or in the pyloric region. A tumor may be present, however, without being possible of palpation. If the attachments of the pylorus are such that it lies beneath the right lobe of the liver and if the malignant growth be small, it will not be discoverable by palpation and thus far at least will simulate a benignant condition. On the other hand, tumors are occasionally present in benign conditions. Sometimes too a thickened pylorus in a thin emaciated patient (the patients who suffer from hypertrophic stenosis of the pylorus are not infrequently thin) may be felt as an oval rather hard mass of the thickness perhaps of the thumb. This mass, however, is smooth

in outline, not rough as a malignant tumor is almost sure to be, and the sensation of hardness conveyed to the finger-tips is not apt to be so noticeable as in cancer.

It is sometimes said that the rapidity and the extent of the emaciation in these cases may prove of differential diagnostic significance—indicating whether the underlying condition is malignant or benign. This is not true, however, as any stomach specialist of large experience well knows. In the present case there was a loss of nearly 40 pounds in a few months at the beginning, though it is clear that the condition is absolutely benign. On the other hand, emaciation in cancer of the stomach may be delayed for a good while, and it is often surprising how good is the general health of patients in whose cases we are forced to the conclusion of the existence of gastric cancer in a well developed stage.

While cancer patients emaciate to a great extent toward the end of malignant disease, those suffering from benignant obstruction of the pylorus may lose weight very rapidly and very early after the symptoms first declare themselves. Emaciation then cannot be considered a reliable differential sign. Later on in cancer cases when cancer cachexia develops, being due evidently to the absorption into the system of toxins that are elaborated by the growing cancer cells, patients take on an appearance quite characteristic of malignant disease; but this occurs at a time when it is too late to hope for benefit from surgical interference or when little can be done except to make the patient's progress toward the inevitable fatal termination as comfortable as possible.

As soon as a positive diagnosis of malignancy is made the patient should be given the chance for life and future health that an operation may afford. There are few real cures by operative extirpation of the cancerous tissues, perhaps not more than one in 300 or 400, perhaps even less. Certainly resection of the pylorus affords some chance, however, for saving or prolonging life. If the tumor is found to be inoperable, then, as I have said, gastro-enterostomy affords the patient much more comfort and will add many months to his life.

With regard to benign stenosis of the pylorus, if the surgeon could guarantee absolutely that patients would not die from the operation, then I would advise all of them to have the operation done. The operation, however, is a very serious one. The mortality

is even higher in my experience than many surgeons will allow. Among my own patients the death rate has been nearly or quite 25 per cent. They do not all die immediately after the operation, nor the next day or two, but some of them die of pneumonia within a week, some of them confessedly of faulty technic, perhaps, some of them from shock or collapse. In general it may be said that a mortality as high as one in four of the patients operated upon represents after all too serious a risk to advise patients to take for the sake of a little more comfort in life and that too without a guarantee that it will be enduring.

Not very long ago, I had what seemed a typically favorable case for operation for benignant stenosis of the pylorus. It was a young man who had lost considerably in weight, but seemed good and strong and in whom his years—32—seemed to give assurance that he would be able to stand the operation very well. I had kept him for some time on liquid diet and had found that even this was not being passed on to his intestines and that as a consequence he was obtaining insufficient nutrition. Notwithstanding all the apparently favorable circumstances, however, he died on the third day after operation.

It is only when there is no other possibility of benefiting the patient that I advise operation in such cases. The case that I have cited was one of those in which everything else had been tried. The surgeon was confident of success; he is thoroughly able and competent, and the result seemed very favorable up to forty-eight hours after the operation.

It is perfectly clear then what we should do in the present case. Our patient gets along very well so long as she follows carefully the directions given her. She is fortunately one of those persons who rather like milk and eggs and in whom their consumption in large quantities has so far never brought any distrust or real loss of appetite. When she limits herself to these she at once gains in weight, regains her strength and continues to feel perfectly well, even while pursuing her usual occupation.

At the present time, she is not well but she realizes herself that this is due to errors of diet. She is sure that she has lost in weight, but she does not know just how much, and confesses that she has been afraid to weigh herself, because she does not want to be depressed by finding how much she has run down. For some time

at least now she will be more careful and then she will improve in health. As I have said her diet will have to be entirely liquid. It will consist of strained barley water, or thin rice soup, or bouillon from which the fat has been removed, and two or three quarts of milk a day. Besides this she will take from five to eight eggs a day. These will usually be beaten up in milk, but they may be taken very softly boiled.

When you find patients who are suffering from stagnation of the stomach contents, this is the diet under which they will improve promptly. It must not be forgotten that with this improvement the stomach wall may become less relaxed and the muscle more capable of moving food so that after a while semiliquid diet may be allowed as an experiment. The first thing usually that can be added to the dietary is rice well cooked. After this has been tried several times, the stomach should be washed out to see if any of the rice accumulates because of the tendency to ischochymia. If none of the rice is found, then other cereal substances and certain of the more easily digestible vegetables may be added to the diet. Thickened soups will often prove serviceable under these circumstances as they are very nutritious and at the same time very palatable.

If patients have recurrent attacks of stomach discomfort with vomiting care must be taken to insist on an immediate return to a liquid diet and its continuance for some time. At the beginning of the treatment washing out the stomach will relieve the patient of accumulated material and it will often be found that regular gastric lavage done by the patient will not only prove grateful, but will aid the stomach in overcoming mechanical difficulties and preventing the presence of fermenting proteid material from which various putrefactive products may be absorbed into the system,—producing a sort of toxemia with consequent depression and general ill feeling.

At times the stenosis of the pylorus is progressive and after a time even liquid food will not pass out of the stomach. Patients then become thinner and weaker in spite of rigid fulfilment of every direction as to care in diet. In these cases, inasmuch as the nutrition of the patient is otherwise impossible, an operation is absolutely indicated. If the operation is not done the patients are doomed to a lingering death under the most pitiable circumstances.

With regard to our patient here there is no such serious state of affairs. With care she will be able to live her life for many

years in comparative comfort. It is, of course, very tempting to see friends eating all sorts of foods without being able to share in the pleasures of the table, and occasionally in the past she has not been able to resist the temptation and has made unwarranted additions to her diet. Now at the end of nearly four years, she has practically learned the lesson that these indulgences are not worth the price she has to pay for them. As a result there seems every reason to think that in future she will suffer much less than heretofore from indiscretions of diet.

As to the ultimate prognosis of the case, I do not think that it is very serious. With reasonable care, after the sad lessons of experience she will be able to live her life out to its full term, perhaps, without much suffering. There remains the question of the possibility of cancer developing in the case. Personally, as I have often said, I do not think that there is nearly as much danger of this as is often claimed. Many surgeons seem to consider that most ulcers of the stomach should be operated on because of the liability of malignant degeneration occurring in the scar, even if the ulcer should heal satisfactorily. Some surgeons are of the opinion evidently that as soon as the cicatricial contraction of an old ulcer causes gastric symptoms, an attempt at its excision should be made in order to prevent the development of cancer that is almost sure to follow.

Gastric surgery is not yet in a condition in which we can expect good results for our patients without subjecting them to considerable risk. To be swayed to the idea of having an operation performed because of the possibility of malignant degeneration which does not occur in more than one case out of fifteen is to allow this motive to have too much weight. After all it is the stomach specialist who sees so many of these cases, on whom should eventually depend the decision as to whether operation is advisable for his patients or not. In malignant disease I believe in every patient being given the chance that operation will afford if the case is diagnosed early enough. In benignant conditions, operation is only justifiable where lingering death is inevitable without it and when the patient's condition is such as to justify the hope of a successful result.

Surgery

TIC DOULOUREUX; TRAUMATIC EPILEPSY; CARCINOMA OF THE RECTUM

A CLINICAL LECTURE DELIVERED AT THE JEFFERSON MEDICAL COLLEGE HOSPITAL, PHILADELPHIA

BY WILLIAM W. KEEN, M.D., LL.D., F.R.C.S. ENG. (Hon.)

Professor of the Principles and Practice of Surgery, and of Clinical Surgery in the Jefferson Medical College, Philadelphia; President of the Congress of American Physicians and Surgeons; etc.

RESECTION OF THE INFRAORBITAL AND INFERIOR DENTAL NERVES FOR TIC DOULOUREUX. RECURRENCE IN THE SECOND DIVISION. A SECOND OPERATION IN WHICH RESTORATION OF THE LATTER NERVE WAS DISCOVERED.

GENTLEMEN: The first patient that I shall show you is a woman, S. J., forty-five years of age, whose only previous illnesses, besides the diseases of childhood, are enteric fever at the age of 12, and inflammatory rheumatism at the age of 18 years. Eight years ago, when 37 years old, she complained of sharp pain in the right side of the lower jaw and the right cheek. This soon assumed the form of the disease which is popularly known by the name of tic douloureux, or facial neuralgia. Few if any disorders to which the human body is susceptible are more painful than this, and patients after having suffered for a considerable time are willing to run any risk and undergo any operation which holds out the least prospect of relief. I have often been compelled to take away from such patients all possible means of self-destruction. Only this morning one intelligent, cultivated woman of over sixty told me that she had repeatedly considered suicide. In the morning papers within a few days the statement was made that one patient had actually committed suicide to escape the dreadful pain.

My experience with therapeutic measures has been as a rule quite unsatisfactory. Strychnin in massive doses, electricity in its various forms, quinin, phenacetin, counter-irritation, active purga-

tion with Epsom salts, and other remedies, have been used and occasionally with benefit, but rarely for any length of time. I have often found that the continual giving of drugs upsets the digestion to such an extent that the evil done almost equals the good. After a trial therefore of not over two months I would advise operation. Let me here record one emphatic protest: never have the teeth removed. They are not the real source of the trouble and removing them never does the least good.

As to operations, they may be divided into two classes: intracranial and extracranial operations. The extracranial or peripheral operations involve practically no danger to life. The intracranial operations do have a definite, and in some cases, a considerable percentage of mortality. Hence, as a rule, I always advise a patient to have a peripheral operation done in preference to an intracranial so long as there is any hope of relief by the less grave operation. When we have exhausted our resources in peripheral operations, the head should be opened. Occasionally, as in a case that I shall operate upon to-morrow, in which all three branches of the trigeminus nerve are affected, it is wise to do an intracranial operation first; but the number of cases in which all three of the branches are primarily involved is very small. Practically the second and third divisions are far more frequently involved, and strange to say far more frequently on the right than on the left side. I have never seen a case of bilateral disease. For these last two facts I have no explanation to give you.

I shall not consider to-day the intracranial operations. Of the extracranial operations the removal of the nerve either at its exit from the foramens (supraorbital, infraorbital, and mental), or at some point further back in its course, is the usual one. In the present case, on June 25, 1896, at the Orthopedic Hospital in this city, I removed 2 cm. of the infraorbital nerve and plugged the external end of the infraorbital foramen with disinfected gold foil. I then removed 4 cm. of the inferior dental nerve by trephining the lower jaw. The inferior dental canal was likewise plugged with gold foil. Unfortunately the patient's later history is that which is so common in these cases. She was entirely relieved for 10 months and then the pain returned. She then obtained temporary relief by galvanism. In another year the pain returned more violently. Then strychnin in massive doses was used but

with little if any amelioration. Iron in various forms and cannabis indica were next employed, the latter giving for a time, marked relief. She now comes back, however, after having had a renewed trial of these various remedies at the hands of her faithful physician, Dr. C. B. Weber, of Norristown, with the pain almost as bad as ever, and asks for relief by a second operation, providing I think it can be done. I have advised that she allow me to operate at the site of the first operation, below the orbit. It will not be necessary to attack the inferior dental again, because the pain in that area has not recurred. Sometimes I have found that no nerve regeneration has taken place, and yet a second operation (reaming out the connective tissue at the site of the old nerve filaments) has done good for a year or two. On at least three occasions, however, I have found complete restoration of the nerve. In order to prevent this restoration at the first operation I was careful to plug very firmly both foramens with gold foil. In one branch of the nerve it seems to have been efficient, in the other it has failed. In other cases, I have filled the dental canal with dental paste, and so far as I recall none of these patients has had a recurrence.

I now will proceed to the operation, making an incision at the site of the old scar. I have now reached the infraorbital foramen. No vestige of the gold foil can be seen, but on the contrary a fully formed new nerve occupies the old infraorbital canal. I next chisel away the edge of the orbit corresponding to the infraorbital canal, which facilitates the removal of the nerve. Then I remove 3 cm. of the nerve and hand it to Professor Coplin for a careful examination, the result of which, as well as the result of the operation I will give you later.

[The patient made an uninterrupted recovery. Prof. Coplin reports: Histologically the sections are composed of altered nerve filaments, connective tissue, and infiltrated blood. Sections stained by ordinary methods for the most part are composed of fibrillated connective tissue within which is a large amount of unaltered blood. The sections stained with Weigert's myelin stain, and others by van Gieson's mixture, contain a few nerve fibres intact, but in most of the fibers the axis cylinder fails to stain, and fragmentation of the myelin sheath with a marked increase in the interstitial connective tissue is everywhere to be noted.

Diagnosis.—Chronic interstitial and parenchymatous neuritis.]

PROBABLE FRACTURE OF THE CRIBRIFORM PLATE OF THE ETHMOID, AND POSSIBLY OF THE FRONTAL BONE FOLLOWED BY EPILEPSY, FOR WHICH AN OSTEOPLASTIC OPERATION ON THE FRONTAL BONE WAS PERFORMED

The second patient I bring before you is a young man, W. D., 26 years of age, and a painter by occupation. In May, 1901, he was thrown from his horse and struck upon his forehead in the middle line midway between the eyebrows and the edge of the hair. As he lived 25 miles away from his physician, Dr. Konkle, of Montoursville, Pennsylvania, it was some hours before the doctor saw him. By that time the swelling had become so great that it was impossible to determine whether there was or was not a fracture of the frontal bone. For the first two weeks after the accident he was unconscious, but did not void his urine or feces involuntarily. That he was not entirely oblivious of his surroundings is shown by the fact that when an attempt was made to catheterize him he resisted. One very important symptom was a free hemorrhage from his nose, whether from both sides or from only one is somewhat uncertain; a fact which now assumes more importance than at first would be suspected. When he recovered consciousness it was found that he had lost the senses of taste and smell, but again he is not certain whether the sense of smell was lost on both sides or only upon one. Gradually there has been some slight reestablishment of both of these senses, although they are very imperfect. In fact smell may be said to be gone entirely on the left side, and it is imperfect on the right. You see, therefore, the importance of knowing whether the bleeding was bilateral or only on the left side, and whether smell was lost on both sides or only upon the left side. You can never be too exact in your note-taking. Five weeks after the accident he began to work, but found it very difficult as he was easily fatigued. Other than this nothing of moment occurred until the second week of March, 1902, when he suddenly had an epileptic attack. On August 2, 1902, he had a second attack, and five weeks later, a third. Since that time he has had none. Professor Kyle examined his nose and throat and reports that nothing bearing upon the case is to be seen there. Dr. Sweet has examined his eyes and also reports that there is nothing of moment to be observed there. The urine is normal.

You will observe, that we have to deal with a secondary result

of his accident. This is more important than appears at first sight. Epilepsy is a horrible disease; such that I confess were I myself or one of my children afflicted with it, I should welcome death as a relief. This is especially true when epilepsy begins relatively early in life, as in this case, for it will probably continue throughout his entire life. No possible risk, in my opinion, is so great that I would not gladly accept it if it held out any prospect of cure. In this case, you observe, his occupation is practically prohibited by the disease. He is a painter, but it will now be impossible for him to go upon a scaffold, or to sit on a jack out of a window high above the ground, when he may be suddenly seized with an epileptic fit without the slightest warning (for he has no aura) and be killed by the inevitable fall.

On examining his head I find that right in the middle of his forehead there is a somewhat flat depression about the size of a silver dollar, at which point there may possibly have been a fracture of the frontal bone. It is not only flattened instead of curved, but is somewhat irregular under the scalp. Even if the whole bone was not fractured it is possible that the internal table was fractured. From the bleeding from the nose it is clear that he had a fracture of the cribriform plate with laceration of the dura. Possibly there has also been a laceration of the brain itself, followed by hemorrhage, the clot finally resulting in the formation of a cyst. All these are speculative, but seem to me possible consequences of his injury, and as both he and his wife, as well as their physician, desire that an operation, which may hold out some chance of relief, shall be done, I have promised him that I will undertake it.

I have never heretofore been called upon to open widely the frontal region. In considering this operation I decided that the proper course would be to turn down a rectangular osteoplastic flap with its base toward the nose. This would give it an excellent blood supply through the angular arteries, and by throwing the transverse incision high up under the hair would avoid a bad visible scar. My principal reason however, for thinking this the best flap is that it will enable me to chisel the bone over the superior longitudinal sinus as the final step in opening the bony skull, and so have instant access to the skull in case the sinus should be torn. I should thus be able to cope more effectively with the violent hemorrhage which takes place from a wounded sinus, than if I were to make the base of the flap upward.

In order to judge whether my decision as to the technic is well founded I rehearsed the operation on a cadaver. You might think that this is a needless precaution—at my age, and with the experience that I have had. Remember, if you please, however, that the moment you have reached the age when you are too old to study, to investigate, and to learn, you are too old to be a surgeon. I was very glad in doing the operation on the cadaver to find that the physical conditions were such as to confirm my judgment. I shall now proceed to the operation.

The head of course has been shaved and prepared as usual. I first make a vertical incision 4 cm. to the right of the middle line, and 6 cm. long. Just above the orbit I remove a three quarter inch button of bone by an ordinary trephine. The lower edge of the button is 1 cm. above the border of the orbit. I hope by going so high, to avoid the frontal sinus, and yet by going so low, to reach almost to the orbital plate of the frontal bone. Having taken out the button of bone—which also gives me information as to how thick the skull is—I chisel the skull carefully away down to, but not through the internal table. I next make a similar incision in the soft parts, a similar trephine opening, and chisel the bone in like manner on the left side, 4 cm. from the median line. The upper ends of these two incisions are now united by a horizontal incision which will be just covered by the hair. Next with the osteotome I break through the internal plate, excepting at a point 1 cm. each side of the middle line in the horizontal part of the incision. Under this lies the superior longitudinal sinus, and before chiselling at this point when I might injure the sinus, I want to be ready instantly to turn down the whole osteoplastic flap in order to cope with hemorrhage if it is serious. In order to weaken the bone just above the orbit at the point where it is to be fractured I separate the dura from the bone and try to insert a probe followed by a Gigli wire saw from side to side, by which I will be able to saw the internal table. I find, however, that the ridge in the middle line and possibly the adhesions prevent my penetrating from one side to the other. With the greatest care, therefore, I break through the internal table over the superior longitudinal sinus with the osteotome and apply my elevators. The bone breaks low down on the forehead, and I reflect the whole flap down over the nose. The superior longitudinal sinus is not injured. A small vein about

2 mm. in diameter which enters the sinus at the upper end has been torn, and a moderate hemorrhage takes place. This is quickly controlled by packing a bit of iodoform gauze between the dura and the skull. The sinus at the point where I divided the bone is already very large. Down near the orbital plate where the sinus begins, it is very small, and a wound there would not produce any serious hemorrhage. I am sure I am gratified as well as you are, in seeing that so large a flap (6 x 8 cm.) can be turned down without injury to the sinus.

Again, the frontal sinuses have not been opened, which is very gratifying, and yet the lower edge of the flap is almost on a level with the orbital plate. As soon as the oozing from the surface of the dura is checked by sponging and pressure you notice that there is a marked difference in the color on the left as contrasted with that on the right side, and also that the left frontal lobe is not so prominent as the right. I will next open the dura with a rectangular flap on the left side only, making a flap the base of which is next the sinus so as to avoid any possible injury to it, or to the veins emptying into it. The internal surface of the dura is normal; there has been, therefore, an external pachymeningitis. I see no evidence in the brain itself of any laceration on the surface, nor does touch reveal any abnormality in consistence. In order to make sure, however, that there is no cyst from laceration followed by hemorrhage, I now plunge a narrow knife to a depth of 3 cm. at the middle of the frontal lobe in the anteroposterior direction. As there is no evidence of any cyst, I think I have now reached the limit of a wise interference.

The exploratory operation I have done is justified by what I have told you, but I should deem any further operative procedures inadmissible. On the cadaver I was able to lift up the frontal lobes so as to see clearly the cribriform plate, looking as far backward as the optic chiasm and the pituitary body. This is facilitated very much by the fact that the falx cerebri being very narrow anteriorly one can either pass one's fingers or a retractor upon each side at this point, and lift each lobe, or a retractor can be slipped under the falx and by it I can lift both lobes. What is very easy, however, on the cadaver is not so easy in the living subject. One considerable obstacle to it in this case, and one which decides me not to attempt such exploration is that, as you see, there

are several large veins passing into the sinus which would require double ligature before I could lift the left lobe of the cerebrum, and I do not think that the prolongation of the operation, to say nothing of the possible hemorrhage, would be justified by any probable information to be derived from it. Accordingly I will now replace the flap, and suture it in position. Before doing so, in order to be secure against hemorrhage from the vein which enters the superior longitudinal sinus, I pack a narrow strip of gauze between the skull and the sinus at this point and bring it out at one of the trephine openings.

[The patient made an uninterrupted recovery, the wound healing *per primam*. Up to the time of his leaving the hospital he had had no further attacks, but this is no evidence, of course, of permanent cure (Fig. 1).]

CARCINOMA OF THE RECTUM. INGUINAL COLOSTOMY. AMPUTATION OF SIX INCHES OF THE RECTUM WITH IMMEDIATE AND TOTAL CLOSURE OF THE LOWER END, AND ALSO OF THE PERINEUM, AT THE TIME OF OPERATION.

Our third patient, A. B., is a man, aged 43 years, whose mother died from carcinoma of the stomach. He is said to have suffered from hemorrhoids four or five years ago; other than this he has always enjoyed good health. Eighteen months ago he noticed blood in his stools. A physician who was consulted diagnosticated hemorrhoids, but apparently did not examine the rectum. Six months ago he noticed a change in the shape of his stools which became flattened instead of large and round. He had no pain excepting a dull ache on sitting for any length of time. His ordinary weight is 170 to 175 lbs., but his present weight is about 160 lbs. Examination by the finger instantly discloses a large carcinomatous area beginning at the verge of the anus and extending up as far as the finger can reach. It involves the anterior two-thirds of the circumference of the bowel wall. The caliber of the bowel is much encroached upon, yet the finger can be introduced with moderate ease. The case, therefore, is a very favorable one for an extirpation. In order to be very certain of the diagnosis a small portion of the tumor was first removed and examined in the laboratory by Professor Coplin, who has made a diagnosis of adenocarcinoma.

On July 7, 1902, eight days after his first admission to the hospital, Dr. George W. Spencer made an inguinal colostomy by

FIG. 1.—Showing the frontal flap. The transverse portion of the scar will be entirely covered by the hair, which is shaved off to show the entire scar.

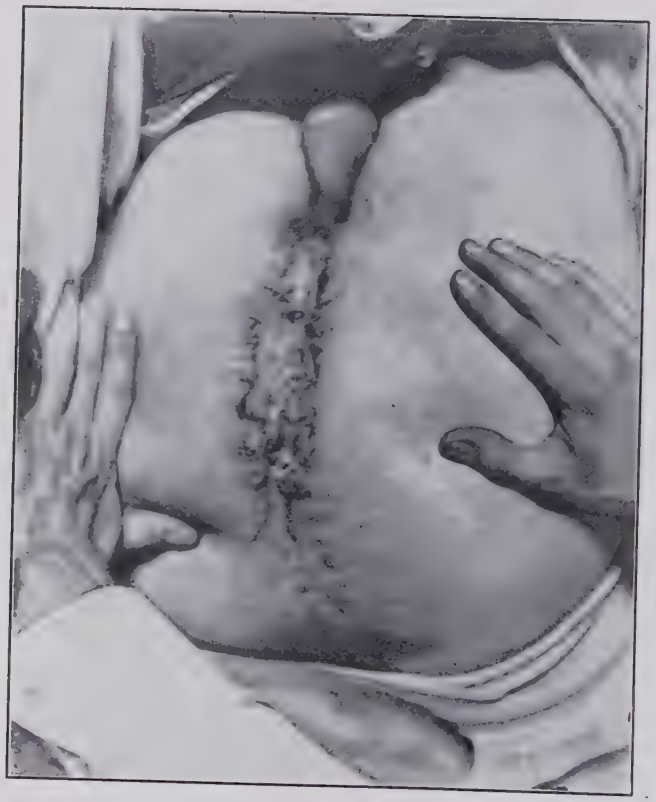

FIG. 2.—Showing total closure of the perineum after amputation of the rectum for carcinoma.

Maydl's method, completely dividing the bowel at the end of a week. In July and August the patient developed several attacks of pleurisy. This pulled him down so that his weight was only about 140 lbs. He was readmitted to the hospital September 30, having regained a part of this weight—up to 156 lbs. As soon as he was admitted the rectum was irrigated twice daily, with a solution of lysol, from the colostomy opening in order to disinfect the bowel and prepare him for the extirpation.

Before beginning the operation let me say a word as to diagnosis. That this patient is suffering from carcinoma would have been easily diagnosticated months earlier than it was if the physician to whom he went had simply taken five minutes of his time and investigated the rectum by the finger. Time and again I have had patients come to me with a diagnosis of "hemorrhoids" or "bleeding piles," and the moment that I put my finger into the rectum a carcinoma was discovered. I have often said to you—and this case reenforces my statement—that more mistakes in diagnosis are made by carelessness than by ignorance, mistakes that are really inexcusable, especially when the life of your patient is at stake. Moreover, remember that in the digestive tract, stomach, bowels, and rectum, we are apt not to suspect cancer unless a patient is past 40 years of age. The digestive tract seems to be a portion of the body in which cancer not uncommonly develops much earlier than in other parts of the body. You are therefore never justified in assuming that such a case is not cancer until you have examined it carefully. In one case Czerny not long since found a carcinoma of the rectum in a young girl 13 years of age—so far as I know, the earliest age at which the disease has been observed in this situation. In the present case the loss of weight is much less than I have usually found in cancer of the digestive tract. Naturally anything that interferes with the very foundation of life, the processes of nutrition, will tell upon the general health and weight more quickly than when the disease exists in other parts of the body. I suppose that in this case the fact that the stenosis is so moderate and that the cancer is so far away from the portions of the intestine concerned in absorption accounts for the relatively slight loss of weight.

I shall approach the rectum by doing a small resection of the end of the spine. An incision, beginning about the middle of the

sacrum at its left border, curves around until it reaches the middle line and is carried forward to and around the anus. The bone is quickly exposed, the sacrum is sawn across at the fourth sacral segment and the bone removed. I am careful not to go higher than this for two reasons: first, on no account should the third sacral nerve be injured, for if injured bilaterally paralysis of the bladder will follow, necessitating the constant after use of the catheter. In this case it would be possible, I think, to remove the carcinoma without any resection of the sacrum and possibly even without resecting the coccyx, but the access to the deeper parts is so much better, and the thoroughness of removal, especially of the glands of the mesorectum, so much facilitated by this method, and the consequences of resection of even large portions of the sacrum and the coccyx are so slight, that I think it best to resect it. As you observe, the rectum is now exposed posteriorly, its attachments on each side are loosened, and the vessels are clamped. I now expose the prostate and a large part of the posterior wall of the bladder. Drawing it down I next amputate the lower end of the rectum 15 cm. above the anus. In doing this a small rent is made in the peritoneum. Flushing of the parts with sterile salt solution and suture of the rent will obviate any trouble. I have resected as much as 15 inches, that is 37.5 cm. of the rectum with the best results. Several glands in the mesorectum are now removed. Instead of drawing down the end of the rectum and fastening it to the skin I shall invaginate it as one does the end of the bowel preparatory to an entero-anastomosis, so that the lower end of the bowel will be entirely closed. Then I shall entirely close the perineum.

In 1898, at the meeting of the American Medical Association, in Denver, I read a paper on, The Advantages of a Permanent Abdominal Anus and of Total Closure of the Sacral End of the Rectum for Cancer.[1] A long experience in the cases there referred to convinces me that this operation has very marked advantages. I have never seen a case in which the rectum was fastened to the perineum in which prolapse did not occur after a certain time, and usually to a most annoying degree. One of my patients whose cancer I removed 12 years ago was so annoyed by this prolapse that I did a second operation, removing the mucous membrane of

[1] Journal of the American Medical Association, Aug. 13, 1898.

the prolapsed bowel, suturing the raw surfaces together and then closing the entire perineal wound. Since that time he has been most comfortable, and filled with gratitude for the benefit he has received from the second operation. No one of the patients on whom I have done this—four in number—has regretted the closure of the lower end of the rectum. What little mucus accumulates in this lower portion of the rectum escapes by reversed peristalsis through the abdominal anus. In addition to the ultimate comfort there is an immediate advantage in shutting off the rectum as a source of infection from the wound itself. This greatly lessens the danger to life as well as adding to the patient's comfort. An abdominal binder is of course required, but no perineal napkin. In two cases I have tried Gersuny's method of twisting the rectum before fastening it so as to make a substitute for the sphincter, but in both cases it resulted in sharp inflammation and total failure so far as forming anything like an efficient anus is concerned.

I have now, as you observe, inverted the lower end of the rectum and closed it by two rows of Lembert sutures. I now close the entire perineal wound, placing two gauze wicks in it for temporary drainage. The cavity left by the removal of the rectum must necessarily fill up with granulation, which will occupy some time.

[The patient made a good recovery, his highest temperature being 100.8° F. The normal was reached by the eleventh day and continued until his discharge at the end of a month. The gauze packing was removed on the second day. The cavity left by its removal contracted almost immediately, and at the end of a month complete closure had taken place. At no time was there any discharge from the bowel; primary union of the inverted lower end took place. His artificial anus was very comfortable and he had usually one or two stools daily (Fig. 2).

Prof. Coplin reported that the tumor was an adenocarcinoma.]

CARCINOMA OF THE UPPER MAXILLA; SUPPURATIVE INGUINAL LYMPHADENITIS; HEMORRHOIDS; RESECTION OF THE HIP-JOINT; HEMANGIOMA; LYMPHANGIOMA; CHOLECYSTITIS; CONCUSSION OF THE BRAIN; INTERNAL HYDROCEPHALUS

A SURGICAL CLINIC HELD AT THE RUSH MEDICAL COLLEGE, CHICAGO

BY NICHOLAS SENN, M.D., LL.D., PH.D.

Professor of Surgery in the Rush Medical College (in Affiliation with the University of Chicago), Chicago, Illinois

CARCINOMA OF THE UPPER MAXILLA

GENTLEMEN: I am at last in a position to make a final diagnosis in the case of this patient on whom I operated at our last clinic. You will doubtless remember that the patient was the subject of a very extensive malignant tumor of the upper jaw, which undoubtedly had its origin in the antrum of Highmore, and which resulted at an early stage, as these tumors always do, in a quite extensive regional metastasis. I concluded at the time that it would be preferable to remove the tumor by first operating on the regional extensions in the lymph glands, and at the first operation I removed a large number of infected glands. At the second operation I dealt with the original tumor, removing the entire left upper maxilla, the palate bone, the malar bone, a considerable portion of the zygomatic arch, the entire floor of the orbit, and, of course, all the soft tissues covering these parts. The patient did remarkably well, showing no symptoms of shock either during or immediately after the operation.

This enormous wound was covered by a flap taken from the temporal region on the same side, that is, by a plastic operation, so as to remedy the defect caused by the removal of the structures I have enumerated. The place from which I removed the flap in the temporal region was paved with Thiersch's skin grafts. This has healed very nicely, but it shows some evidence of stasis—the tissues are a little more vascular and edematous than they would

be were they normal. This edema will disappear in the course of time, as the equilibrium between the arterial blood supply and the venous return in the new tissue becomes established.

This large wound has likewise healed well, and it is now safe to remove the stitches. I was particularly desirous to leave the sutures in place as long as possible because it was my intention to obtain, if possible, primary wound healing and to avoid suppuration. The large wound cavity was tamponed with a large strip of iodoform gauze, which is still in place and without offensive odor. If I had employed any other kind of dressing, any other kind of antiseptic, we should certainly have been obliged to remove this tampon at a much earlier period because of the offensive odor which would have resulted from the decomposition of the wound-products by bacteria, and the evolution of offensive gases. All this has been avoided by tamponing with one long strip of iodoform gauze, which I will remove to-day. I will, of course, remove it through the mouth. You can judge of the size of this cavity by the length of the gauze strip. It is nearly a yard and a half in length and three inches wide.

The wound cavity presents a very satisfactory appearance. It is already paved with very vascular granulations. You will hardly be able to determine by mere inspection, even at this early stage of the process, just where the upper lip was divided,—the line of union is so perfect, even after three or four days, owing to the great tonicity and vascularity of the tissues involved in the wound. That is something we must expect when operating on this part of the face. The eyelids are edematous. They always are after this operation. We have removed the entire floor of the orbit and with it many blood vessels, so that there is always more or less venous stasis in this particular territory. The chemosis has almost entirely disappeared and the eye itself is still normal, showing that we did absolutely no damage to the posterior part of the orbit, which was considerably involved in this case, nor to the eye. The epidermization is complete and we need no dressing here. The remaining part of the wound surface will be covered with a very simple dressing and we will replace the iodoform gauze tampon by a much smaller one, one of about half the size.

Of course, the patient now has a decided nasal twang to his voice, and he has considerable difficulty in enunciating properly,

so that he is quite unintelligible. This is simply the result of the removal of a little over half of the roof of his mouth. When the flap recedes and becomes attached to the granulating wound surface beneath, his voice will be improved very much and particularly so if we can furnish him with a well fitting prosthesis. This was a pitiable case when he first presented himself, and even if a recurrence should take place in the course of a few months the patient will still have profited by this operation, which will give him absolute relief from his trouble for some months at least. Besides, there is a bare possibility that there may not be any recurrence at all, or not for a long time at least.

We are now ready to make a final histologic diagnosis of the tumor and it confirms our original clinical diagnosis. This section, which was removed from the original tumor mass, shows us a very beautiful picture of a carcinoma. You notice here an alveolated field, that is, there is a very delicate reticulum with numerous small alveolated spaces, and these spaces are crowded with young epithelial cells. There is one structure which I would like to have you notice particularly, and that is these very small round cells, not in the spaces but in the reticulum of the connective tissue. These are the structures that Professor Gussenbauer described at the last meeting of the German Congress of Surgeons, and he still holds the opinion which he formulated twenty years ago, that the pre-existing tissues take an active part in the process of tumor formation, something that we have always contended against in this country. He exhibited specimens representing carcinomas of different organs and called the attention of his colleagues particularly to these round cells in the stroma, which he believes are young carcinoma cells. Very few of his colleagues endorsed his views, because it is against all physiologic and pathologic laws in reference to cell formation. These small round cells are leukocytes and embryonic epithelioid cells that are formed from the pre-existing tissue and are not destined to form a part of the tumor tissue. The irritating effect of the growing tumor is directly responsible for the formation of these cells. Gussenbauer speaks of a cell formation produced by the as yet unknown virus of malignant growths, a theory he taught thirty years ago and to which he still adheres. It is difficult to understand how any lymphoid structure, such as the lymphatic cells, can be transformed into epithelial cells. Such a transformation of biologic

elements never takes place. Observe these cells particularly as you examine the specimen and remember that they are merely the result of a local irritation.

SUPPURATIVE INGUINAL LYMPHADENITIS

Some of you may remember this patient who came here a few weeks ago with a very extensive suppurative inguinal lymphadenitis involving the glands in both groins. We enucleated two or three masses on both sides and found that they were very soft and also that the process had already extended into the surrounding loose tissue,—there was also considerable periadenitis. This enucleation has been followed by a very satisfactory and speedy repair and there is now absolutely no indication of the extent of the original infection, nor of the amount of tissue lost by the suppurative process and the operative procedure. The wound is now very small and will become still smaller. We originally had a defect here about half as large as my palm, but the newly developing tissue has filled in this defect and by its contraction it has brought the wound margins closer together, leaving now a vascular scar no larger than three thumb nails. This is a very beautiful illustration of the beneficial results of cicatricial contraction in the healing of large surface defects. The skin has been drawn from all sides by the healing process, thus diminishing the field for epidermization. The patient is now in excellent condition and able to leave the hospital whenever he chooses to do so.

HEMORRHOIDS

This is the case of hemorrhoids we operated on early last week. The result, as you see, is a most excellent one, and I again call your attention to the value of the rectal tampon in preventing any unusual prolapse of the hemorrhoidal stumps. There is absolutely no prolapse here, hence healing will take place very rapidly and it is greatly accelerated by the mechanical support incident to the resort to the rectal tampon.

RESECTION OF THE HIP-JOINT

This is the patient that I exhibited to you last week in demonstrating the value of the deep tampon in resecting joints for affections complicated by large peri-articular abscesses, as was the case

here. We could not expect in this case to eliminate the suppurative process completely, owing to the large number of fistulous openings, but we did everything in our power to eliminate mechanically the products of the suppurative inflammation. There is no suppuration whatever from the resected hip-joint. The gauze tampon which we inserted at the time because of suppuration deep down at a point corresponding to one of the fistulous openings, has now been in place for four weeks and there is no offensive odor, showing that we have the suppuration well under control. I will remove the tampon, and as I do so I meet with considerable resistance, as we should naturally expect, from the granulations having permeated the meshes of the iodoform gauze. This tampon is of considerable length, about a yard, so that the cavity here must be of some size. The fresh young granulations enmeshed in this gauze have been injured somewhat by removing the gauze, hence there is now a slight hemorrhage. This opening will now be tamponed to a depth of about two or three inches and not entirely into the joint, as we did the last time. The cavity will heal very rapidly, because, as indicated by the wound secretion and the condition of the tampon, the cavity is absolutely aseptic.

HEMANGIOMA

This little girl was operated on at our last clinic for an arterial angioma involving the lower right eyelid. Of course, it was about the size of a dime and of congenital origin, as these tumors always are. It encroached very closely on the tarsal bone and the free border of the eyelid. I intended to treat this case by ignipuncture had it not been for the location of the angioma. Had I done so, the healing by cicatricial contraction, which always takes place after this method of treatment, would have resulted eventually in the formation of an ectropion. As I was extremely anxious to avoid this, I resorted to a clean incision, and in this connection I again call your attention to the simplest plastic procedure for covering a limited cutaneous defect. I cut out a square piece from the margin of the lid and then carried the incisions along the border of the eyelid on both sides for at least half an inch beyond the island of tissue that I had to excise. Then I raised these two little flaps and brought them together without a particle of tension. The wounds have healed well by primary intention throughout, and in

the course of another week or two it will be almost impossible to detect the line of incision, so perfect will be both the anatomic and functional result.

If I had resorted to flap formation, taking the flap from the temporal region, I would have had two wounds to deal with, and another place for scar formation. At the same time the cosmetic effects would not compare with those obtained by the very simple procedure I have just shown you. By making these two little flaps, one on each side of the denuded area, I can draw the tissues together sufficiently to unite the wound margins without a particle of tension and there can be no danger of ectropion. I was also very careful not to interfere with the orbicularis muscle during the operation so as not to impair in any way the function of the eyelid.

LYMPHANGIOMA

In this little child we have a genuine Cohnheim tumor subject. At one of our recent clinics I removed a tumor from the upper lip by making a submucous resection of a part of the lip and the result has been excellent. A few days ago my attention was called to a tumor that involved the lower portion of the chest. On examining it I found that it was not discolored and that the overlying skin was freely movable. There was evidently no connection between the tumor and the skin. The tumor felt lobulated and after a slow, long continued pressure the tumor gradually diminished in size. These two facts seemed to point to a possible lymphomatous nature of the tumor, and yet it is very rare indeed to find a lymphoma in so young a subject. We therefore made a diagnosis of vascular tumor and took it for granted that we should find a venous angioma either with or without any of the other elements of a compound tumor.

When I performed the operation, as soon as the tumor was exposed, the diagnosis was very evident. It was a vascular tumor. It showed many large blood vessels, and when I cut into the tumor we found enormous lymph spaces. It is a vascular lymphangioma. There was also present a considerable amount of fat tissue, so that the tumor was composed of dilated veins, lymph spaces, and adipose tissue.

We did not resort to any drainage here, but sutured the wound throughout and then sealed it with collodion. It evidently has

closed by primary intention. I wish to call your attention to a little swelling above and below the line of suturing, something that I have almost invariably observed after the removal of a lymphangioma, either large or small, when the wound is treated without drainage. This swelling is not the result of an extravasation of blood, but it is the result of an escape of lymph from the cut lymph vessels communicating with this tumor and running into the loose tissue beneath the flaps. If I opened this wound now, I could show you a fluid resembling in every respect the fluid we find in normal lymph structures. This eventually will be absorbed. If not I shall take a probe and separate the wound margins and then squeeze out the accumulated lymph. I will not remove the stitches today, but will leave them in for a few days more.

CHOLECYSTITIS

I have presented this case to you on a number of different occasions because clinical features continually arose that required further explanation. We found no stones in the gall-bladder, but all the indications of a very violent cholecystitis, an inflammation of the mucous membrane lining of the gall-bladder and the bile ducts. The lining mucous membrane of the biliary ducts was so swollen that it offered a serious impediment to the flow of the bile into the intestinal canal. The treatment indicated was to combat the inflammatory condition of the gall ducts by injecting lysol solution.

We opened up the common and the cystic ducts by repeated catheterization with a silver bougie. I demonstrated the technic of this little operation, and it is one you will occasionally have use for in the treatment of these cases. I find that the bile has now free entrance into the intestinal canal, and that the amount of mucus in the gall-bladder is considerably diminished, so that we are now at liberty to abandon instrumentation of the bile ducts. We have already done away with drainage, and the opening will gradually become narrower and narrower. We will watch the patient a few days more, and then we will demonstrate the patency of the common bile duct before he is finally discharged.

CONCUSSION OF THE BRAIN

A few days ago this little girl was found unconscious at the bottom of a stairway. When she was brought to the hospital all

we could discover was a deep suggillation about the occipital region of the skull, and as she was unable to give any satisfactory account of herself or even to converse rationally we were somewhat at a loss to account for her semicomatose condition. The question was as to the nature of the cerebral affection. The attending physician surmised that it might possibly be an inflammatory affection, in consequence of which two incisions were made, but no pus was found. This very deep extravasation of blood beneath the scalp spoke in favor of a trauma. The patient in falling undoubtedly struck on the occipital region and the extravasation of blood occurred beneath the pericranium. There was no bleeding from the ears, no suggillation of the conjunctiva, and evidence pointing to a fracture of the skull was wanting.

The comatose condition in this instance was unquestionably the result of cerebral commotion. There was no laceration of the brain tissue, no intracranial hemorrhage, because we have no focal symptoms; hence a condition of the brain involving the entire brain substance, the result of concussion. The patient is now rapidly improving from the immediate effect of the injury and we look for no further complication. However, in all these cases a very guarded prognosis must be made, as cerebral concussion may give rise to remote but very disastrous complications. We should never lose sight of such patients. They must be watched so that any complication may be met promptly. Hence we shall recommend that this little girl remain in the hospital for another week or two.

INTERNAL HYDROCEPHALUS

This is a case of very advanced hydrocephalus, one in which all the sutures have failed to unite. The posterior fontanelle is widely open, and so too the entire sagittal suture from the occipital protuberance to very near the anterior fontanelle, and widely separated. The anterior fontanelle is open somewhat, but I can indent the frontal bone very readily. The fontanelle itself is bulging considerably, showing great intracranial pressure. The head has the appearance of an inflated bladder and all the veins show very plainly.

I pass around a skiagram which I want you to examine carefully. I believe it is rather negative, but negative in the right direction. That is, I want to settle the very important question

whether it is an internal or external hydrocephalus, but as it is complicated by a congenital spina bifida, I have very little doubt that this is an internal hydrocephalus and I believe that the skiagram is in favor of that diagnosis. If this were a case of external hydrocephalus we should expect to find somewhere about the base of the skull a dark mass or shadow representing the compressed brain substance, which it would be more difficult to transilluminate than the overlying cerebrospinal fluid. Instead of that we find the lightest part of the picture at about the middle of the skiagram, which leads us to suspect that the fluid is on the inside of the brain in the distended lateral ventricles, and that the brain tissue is extremely attenuated by the terrific intracranial pressure.

There is very little hope in these cases. Professor Brainerd made the first attempt of treating these cases with some success by tapping the lateral ventricles and following this by the injection of tincture of iodine. The treatment has not been generally adopted. All the procedures that have so far been proposed are mentioned in a very discouraging manner in all the text books. I could, as I have repeatedly done in other cases, aspirate the cerebrospinal fluid, but in less than twenty-four hours the same amount of fluid would have accumulated again and nothing would be gained by such a procedure. Permanent drainage has been repeatedly tried, only to be abandoned because too often the drainage-opening became a portal of invasion for bacteria, and then the child invariably died of leptomeningitis. In this case, of course, the puncture could be made through the spina bifida, but the result and attendant danger would be exactly the same. The tapping of these cases of internal hydrocephalus has usually been done through the anterior fontanelle or anywhere about the lateral aspect of the skull.

I have given the patient some thought and I feel that these cases should be given every chance to which they are entitled. It occurred to me that great benefits might accrue from subcutaneous drainage, and I propose in this case to have the fluid absorbed by the subcutaneous tissues. You know that we inject saline solution, a pint or a quart at a time, and it is absorbed very nicely, and I see no reason why the connective tissues and lymphatics should not dispose of the cerebrospinal fluid in the same way. My idea is to remove by subcutaneous drainage, gradually, the fluid from inside of the cranium into the loose connective tissue outside the cranium,

the tissue between the skin and the cranial bones. It is a new procedure and is in a measure experimental. I have not been able to try this on the lower animals because we do not very often find hydrocephalus in animals, but reasoning by analogy I feel that the plan is feasible and the only one that will perhaps benefit the child. There is absolutely no risk attending the operation and the benefits that may accrue therefrom warrant its performance in this case.

I will make a small curved incision at the point where we expect to penetrate the skull; then we will undermine the tissues to a considerable extent and make a large pocket into which the cerebrospinal fluid will drain and from which I hope it will be absorbed. The drainage will take place gradually and therefore I do not believe that the fluid which flows out of the cranium into the tissues will be replaced by a new accumulation. I shall not make any attempt to inject an irritant solution into the lateral ventricles at this time, but I may do so later on if I deem it of service. The object in view at this time is to furnish for the lateral ventricles a continuous, slow drainage. Of course, this child may die on the table because we may not be able to regulate the escape of cerebrospinal fluid with the necessary degree of accuracy. This escape of cerebrospinal fluid may be followed by congestion, convulsions, and death. Later we may have the remote results incident to this procedure in the way of infection, the same as when we resort to open drainage. But in this operation I know we shall minimize the danger of drainage infection.

I shall now select the point of puncture. I shall not choose the frontal region, but in this instance I shall open the skull between the temporal and frontal bones. There is a vein of considerable size which we must divide in order to make our flap large enough. Here I am in the vicinity of blood vessels of large size and consequently also a large lymph supply, that is, in the region of the temporal artery. I will make the subcutaneous pocket in the region of the temporal artery. I can also from here reach the lateral ventricles without being obliged to resort to the use of bone cutting forceps. Then, too, I am at a safe distance from the middle meningeal artery which I am particularly anxious to avoid. The bones are separated by a bridge of connective tissue that has not as yet been converted into bone.

I make the flap something like the flap of Horsley. This child cannot afford to lose any blood and therefore I must proceed very cautiously. I lift the flap up from the imperfectly developed bone, reflect it, and then I make it into the pocket into which I wish to drain the cerebrospinal fluid. I will do that, if I can, with a Kocher's director. You can see here very plainly the pericranium. Into this pocket I am going to insert a thoroughly disinfected, well fenestrated rubber drainage tube. There is only one trouble that I fear and that is the closure of the fenestra in the drainage tube by coagulated blood. I want now to make firm pressure over this pocket so as to arrest any hemorrhage before I insert the drain that is intended to drain the lateral ventricles. I shall use a drain about the size of a lead pencil in thickness and about eight inches in length. Of course, there is a possibility that when the tissues are regenerated the openings in the tube may be closed by the newly formed granulation tissue. But these are mechanical difficulties that we cannot overcome.

We insert the drain into the pocket by means of a dressing forceps. You can see the drain very plainly through the scalp. So that there will be no danger of the drain becoming displaced, I will suture it to the soft tissues by a subcutaneous suture, which I pass through the tissues under the tube and tie on the outside.

The next step is the most difficult. I want to introduce the other end of the tube into the brain cavity. I do not wish to insert more than an inch or an inch and a half at the most, and I shall insert it between the temporal and frontal bones. With a very small knife I cut down very slowly. I expect as we open the skull that the enormous intraventricular tension will bring about a gush of cerebrospinal fluid. I have cut through all the coverings and I am down on the brain substance itself, which we must penetrate in order to introduce our drainage tube. We do that with the greatest caution, using forceps, and proceeding very slowly. I will have to penetrate more brain substance that I expected. The fluid comes out in a large stream. The end of the tube is now in the lateral ventricle and I expect that the fluid will gradually percolate through the rubber drain into this large pocket in the temporal region. Of course, I do not want any air to enter the wound for fear of producing an air embolism.

The wound surface will now be irrigated with a normal salt

solution and the flap stitched back into place over the tube. The fluid is already accumulating in the pocket, as you can see by the swelling in this region. What I want to avoid particularly is infection, which has thus far interfered with all attempts at successfully treating hydrocephalus by drainage.

We will apply a compress in order to bring the bones closer together and to stop the escape of the cerebrospinal fluid to any place other than the pocket, by passing an elastic bandage around the entire head of the child. As I expected, because of the enormous intraventricular pressure, we have here a hernia of the brain, which is easily reduced, however, and held in place by the sutures which we put in the edges of the flap. The intracranial tension is already reduced to a considerable extent. I will suture with horse-hair, seal the wound with collodion, and apply a gauze and cotton dressing over the entire head. Over all we will apply the elastic bandage, which will not interfere with the escape of the cerebrospinal fluid. At some other time I shall inject an irritant solution, such as iodine, either by puncturing the head or through the spina bifida and reach the ventricles in that way. So far as I can tell the child has no tubercular lesion of the meninges of the brain, which, of course, increases its chances considerably. We will watch the outcome of this case with considerable interest as it is the first operation of this kind which was ever performed for hydrocephalus.

[Following the operation, the child's head decreased rapidly in size and its body increased correspondingly. Two weeks after the operation, however, the child died. As far as the principles of the tunnelling operation are concerned, the operative procedures are a success, and in a suitable case I shall be encouraged to try them again.]

THE ENDURING RESULTS OF TOTAL BILATERAL RESECTION OF THE CERVICAL SYMPATHETIC IN BASEDOW'S DISEASE

A CLINICAL LECTURE DELIVERED IN THE SURGICAL CLINIC OF THE UNIVERSITY OF BUCHAREST

BY THOMAS JONNESCO, M.D.
Professor of Surgery and Director of the Surgical Clinic in the University of Bucharest, Roumania

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GENTLEMEN: There is no doubt in the minds of any of those who have seen patients with Basedow's disease treated by my method of total bilateral resection of the cervical sympathetic that the symptoms of the disease are relieved in at least a great majority of the cases and that the patients feel practically cured. There has been, however, some feeling of uncertainty as to the length of time that the amelioration of symptoms produced by this operation might last. Basedow's disease is still classed as one of the major neuroses, a functional rather than an organic affection. It is well known that almost any operation performed for certain neuroses may give rise to considerable relief, and yet subsequent recurrence of symptoms shows that the affection itself has not been benefited. I am in a position to-day to show you some patients who were operated upon more than five years ago—one of them indeed seven years ago—and to demonstrate to you that the relief afforded is lasting and that patients after this length of time are still enjoying the freedom from annoying symptoms that characterized the first few months after operation.

CASE I.—The first patient that I shall show you is a very striking example of how much good can be accomplished and how permanent are the beneficial results obtained by exsection of the cervical sympathetic in cases of Basedow's disease with very severe symptoms. The patient is now forty-two years of age. When she was operated upon, in March, 1897, she was thirty-seven years old. She is a Hungarian, and her history has many points of interest that are typical of the affection from which she suffered, and is thus worthy of your consideration.

As is so often the case, there was a history of nervousness in her immediate ancestors. Her father especially, she said, was inclined to be easily excited and was likely to become angry without very much provocation. He lived to be sixty-eight years of age, dying from some respiratory trouble the result of an attack of influenza. Many of her ancestors on her mother's side were tuberculous. Her maternal grandparents, her mother at the age of thirty-two years, two of her brothers, one at the age of twenty-four and the other at the age of twenty-two years, and a sister at the age of thirty-seven years, died of pulmonary tuberculosis. This sister had a child that died of meningitis, very probably tuberculous, at the age of nine years. Her only living child, some thirteen years of age, is thin and anemic, and probably deserves to be called, in the language of the older physicians, scrofulous, for there is besides her delicacy a distinct tendency for the lymphatic glands to become enlarged for very slight causes.

It is evident that there is a distinct family tendency to delicacy of constitution, and it is not surprising that in some members of the family this should manifest itself not in the usual way, by liability to tuberculosis, but by failure of the nervous system to fulfil its functions. Notwithstanding this, the patient's personal history is not of very great interest. She does not remember to have suffered from any of the ordinary infectious diseases of childhood, although at the age of five years she suffered for two months from a very persistent gangrenous condition of the interior of the mouth. This was very probably noma, and raises the suspicion of her having had measles or some other infectious disease shortly before. The scar may still be seen on the inside of the mouth.

During her sixteenth year she suffered with typhoid fever, which was followed by almost entire loss of her hair. This, however, has been entirely restored to her, as you see, and she has now a splendid growth of hair. Her menstruation was regular, not painful, and not very profuse at the beginning of her menstrual life; but since her nineteenth year she has suffered considerable pain and the bleeding has been rather profuse—lasting usually five days. She has never been pregnant. She has never suffered from any disturbance of her external senses until the development of her Basedow's disease.

About nine years ago, that is four years before she was oper-

ated upon, she began to suffer with severe headaches. These lasted for two months, and in spite of all medicinal treatment continued to recur. At times, after the second month, the headaches were accompanied by distinct attacks of palpitation of the heart, during which the heart-beats not only became very noticeable to the patient, but in addition a source of considerable discomfort. During the course of the year, and especially during the winter, the patient without any additional reason began to suffer from more severe attacks of cardiac palpitation.

These initial symptoms of Basedow's disease were soon followed by the development of the other characteristic signs of the affection. Before eight months had passed, the neck began to enlarge, so that the patient had to have the collars of her waists made wider than before, or else allow the upper button to remain unfastened. At this time, too, her friends began to notice that her eyes were becoming more prominent, and she herself felt that her eyes watered considerably and that the tears occasionally ran out onto her cheeks. After this her illness became gradually progressive, and she had a constant feeling of burning over the face and the region of the neck. This feeling of warmth was the source of so much discomfort to her that she could not sleep comfortably at night if her neck was at all covered. The perspiration of the affected parts became very profuse and drops of sweat were almost constantly present on her face.

Two years after the onset of the symptoms the patient began to suffer from tremors of the entire body. It is not surprising that with these severe physical symptoms there should also have been severe psychic disturbances. The patient became very much depressed; she was easily excited to anger; she was capricious in her moods and irritable. Nervous symptoms of different kinds in the peripheral nervous system began also to develop. At times she suffered severely from neuralgia of the facial nerve, and she had neuralgic pains in the right arm and in both ankles. It is not unusual to find in these cases that the peripheral nervous system is extremely sensitive to variations of temperature and of moisture in the air, and that neuralgic pains sometimes spoken of as rheumatic pains develop in conjunction with Basedow's disease.

While there was considerable disturbance of her digestive tract, she never suffered with icterus. A disturbance of the biliary func-

FIG. 1.—Case I before operation.

FIG. 2.—Case I shortly after operation. At the present time, almost five years after the operation, the scars in the neck are linear cicatrices; the exophthalmos and the goiter have not recurred, and there is nelther tachycardia nor tremor.

FIG. 3.—Case II before operation.

FIG. 4.—Case II more than six years after the operation. Complete freedom from subjective and objective symptoms.

FIG. 5.—Case III four years after the operation. No recurrence of symptoms.

tion, with the consequent production of a mild form of jaundice, is not unusual in Basedow's disease, but was not present in this patient, though many of the other gastro-intestinal symptoms were noticed. From time to time she suffered from diarrhea. Characteristically enough, however, there were intervals during which distinct constipation existed. She suffered with loss of appetite, and as a consequence lost in weight and became more nervous and irritable. She had been carefully treated medicinally by a number of clinicians, but absolutely without any beneficial results.

Just before the operation was performed the following notes as to her condition were taken: The patient is a little above medium height, well and strongly built; her muscular and skeletal systems are well developed. In the lungs nothing abnormal is to be found. The thorax generally seems normal, and the only thing noticeable on inspection is the presence of a flutter in the precordial region, evidently due to the rapidity and force of the heart-beat. The most noticeable features on inspection are the eyes, which exhibit a marked exophthalmos (Fig. 1). This has advanced to such a degree that, even when the lids are brought together as forcibly as possible, the eyeballs are not completely covered. On the left only a very narrow slit remains between the lids, so that the ball seems practically covered. On the right, however, the impossibility of covering the eyeball completely is very noticeable, and produces the peculiar appearance sometimes spoken of as lagophthalmos. This term, which means hare-eye, is used because of the resemblance of the appearance to that of the hare, which does not cover the eyeball completely when it sleeps.

As might be expected, there is some irritation of the conjunctiva because of the failure of the lids to close. Careful measurements show that, even when the greatest effort to close the eye is made, the whole of the cornea of the right eye and four millimeters of the sclera remain uncovered. There is not excessive congestion of the conjunctiva, but there is a distinct tendency to exaggerated formation of tears. The von Graefe symptom is easily demonstrated, especially on the right side. When the finger is brought downward, it soon becomes evident that the upper lid does not follow the movements of the eyeball as it does in the normal condition.

The Stellwag symptom is also present. Any of you may easily

see this by looking at the patient and then at any of the attendants. You will notice, in the first place, a widening of the palpebral fissure, due to retraction of the upper lid, and, in the second place, diminished frequency and incompleteness of winking. It is this failure of the winking habit that allows the accumulation of irritant material on the conjunctiva and thus brings about the hyperemic inflammatory condition which often proves so serious to the patient's eyes in the course of exophthalmic goiter.

Besides von Graefe's and Stellwag's signs we have in the present case a certain amount of external ophthalmoplegia,—that is, an interference with the movements of the eyeball as they are guided by the external muscles of the eye. If we ask the patient to look from side to side, temporary strabismus occurs, and sometimes the eyes remain crossed for a few moments after the movement is completed. Möbius's sign is also present. This can be demonstrated by having the patient follow the finger as it is gradually brought very close to the end of her nose. One eye will be seen to deviate outwards when the patient attempts to converge the eyes upon the finger when it is close to the nose,—there is defective convergence for near objects. We have, in a word, in this patient all the characteristic eye symptoms of Basedow's disease, and for that reason she is worthy of your attention.

I have had a careful ophthalmoscopic examination made by Dr. Kugel. The eye-grounds are normal and the optic nerve itself does not seem to be affected. The internal circulation of the eye appears normal. There is an insufficiency of the internal recti muscles, which causes lateral divergent strabismus. The pupils are dilated, but they react both to light and in accommodation, though there is a slight amount of photophobia. This is probably due to the sensitiveness begotten of the irritated condition of the external eye structures because of the failure of the lids to cover them.

After the eyes, the most interesting feature is the protuberance of the thyroid in the neck. The goiter is quite large and affects mostly the left lobe of the thyroid gland. At the level of the thyroid cartilage the circumference of the neck is about thirty-eight centimeters. Over the struma itself the circumference is thirty-eight and one-half centimeters. The vertical diameter of the struma is about sixteen centimeters. The enlarged thyroid gland pulsates strongly, and when the stethoscope is applied to it, it is easy to

hear a distinct systolic murmur. This systolic murmur can also be heard over the carotid arteries. The heart seems to be enlarged. The apex-beat can be felt in both the fourth and the fifth intercostal spaces. The relative cardiac dulness is considerably increased. As we pointed out a moment ago, the left side of the thorax is thrown into vibration by the strong cardiac palpitation. At the apex one hears a soft systolic murmur, which is conducted into the axilla.

The tachycardia is very noticeable. Even when the patient is at rest and has been at rest for some time the pulse-rate is from 120 to 150 a minute. After even slight exertion it rises above 150, and after she has come upstairs it increases still more. The radial pulse is very small in comparison with the strong heart-beat. The mammary glands are hypertrophied. There is a rapid, rather coarse tremor in the upper extremity.

Most of the patient's secretions are noticeably increased in amount. There is excessive sweating of the face and neck and of the upper part of the thorax. There is an increase in the amount of sputum, though this is not enough to cause any discomfort or to make it a noticeable feature of the affection. There is a gush of tears from time to time and always an excessive lachrymation. The abdominal organs seem to be normal. Nothing pathologic was found upon examining the pelvic organs, and her menstrual symptoms seemed to be due to her nervous (Basedow) condition. Her urine contains neither albumin nor sugar; her spleen is not much enlarged, and her liver is normal. There is nothing special to be noted with regard to her skin or mucous membranes. Her lower extremities are slightly edematous. Her external sexual organs are normal. The temperature on the morning before the operation was 37° C. (98.6° F.).

After the patient had been some days under observation, and proper preparations had been made, total and bilateral extirpation of the cervical sympathetic was done at one sitting. The incision was made first on the right side, as it was expected that here the most difficulty would be encountered. The cervical region on this side proved to be very rich in blood-vessels, and all of the tissues were congested. The sympathetic chain of ganglia was found without much difficulty, however, and the section was completed without the slightest accident. The whole of the cervical sympathetic was

extirpated. The superior cervical ganglion was torn from its bed, and the upper part of it seems to have remained behind. Otherwise we have here the complete specimen of the three sympathetic cervical ganglia. After the completion of this part of the operation the pulse was between 80 and 90 a minute. On the left side we found the sympathetic nerve, and especially the lowest cervical ganglion, twice as thick as on the right side. On this side also the uppermost cervical ganglion could not be completely removed, and its superior portion was left in place. The branches of the thyroid artery on this side were at least twice as thick as normal. This part of the operation was, however, accomplished without any untoward incident. The operation lasted altogether an hour and twenty minutes. The amount of chloroform used was about 150 c.c.

The effect of the operation was almost immediate in certain respects. I have already said that the pulse after the removal of the sympathetic ganglia on the left side dropped to between 80 and 90 a minute. There was a further drop after the removal of the sympathetic on the left side to about 60, and a reaction an hour later to about 80, at which number the pulse remained. One hour after the operation the lagophthalmos had completely disappeared, and the patient's eyelids completely covered the ball for the first time in several years. The tendency to sweating of the face and neck had already disappeared and the cheeks were paler than they had been for some time.

After twenty-four hours, the notes show that the patient had been quite comfortable since the operation, had slept well, and was well satisfied with the results thus far. She could close her eyes well and had no more sensation of pressure within the thorax. When asked to hold out her hand, the tremor was much less marked than before the operation, and, considering the natural nervousness consequent upon a serious operation and an hour and a half of anesthesia the day previously, was considered to be not abnormal. The von Graefe, Stellwag, and Möbius symptoms had completely disappeared. The pulse had not been above 100, and was usually below 90 a minute, unless there had been some special reason for excitement.

Four days after the operation the pulse was about 80 a minute, and was not easily disturbed by movements of the patient or by the slight excitement consequent upon the visit of the surgeon.

The exophthalmos had completely disappeared. Her general nervous condition was much better than it had been before the operation. She was not so irritable, and was quite pleasant in her disposition. Her friends had noticed this change in her, and she herself was especially pleased to find that the depressed condition of mind so constant before the operation had practically disappeared.

On the seventh day after the operation the bandages were removed and the dressings changed for the first time. On both sides of the neck healing had taken place by primary union. At this time careful measurement of the neck showed a circumference of thirty-five centimeters. This is more than three and one-half centimeters less than it was before the operation. The thyroid did not pulsate as it did before the operation, and the systolic murmur, which could be heard so easily, had almost entirely disappeared.

On the twelfth day after the operation the patient, considering herself perfectly cured, was allowed to leave the hospital. Except for a slight tendency to tachycardia and a pulse that beat from 80 to 90 a minute, all the symptoms of Basedow's disease had disappeared. (See Fig. 2.) Psychically as well as physically the patient was in a very satisfactory condition. About six months after the operation, according to my notes, I found her condition very satisfactory, and she expressed herself as very well contented with the results. Since then I have seen her at intervals, and the amelioration of her symptoms has continued.

At present she insists that she is completely cured. Certainly all the symptoms which were a source of discomfort to her have disappeared. Absolutely no eye disturbances are present. Her goiter has entirely disappeared. The circumference of her neck is somewhat less than thirty-five centimeters. The apex-beat is normally situated, and there is no palpitation either subjective or objective. Instead of the vibratory movement of the chest, because of the cardiac palpitation, there is now a simple apex-beat that can be covered by the points of two fingers, in the fifth intercostal space. The pulse is now from 80 to 85 a minute, instead of 150, as it was at the time of the operation. When she walks rapidly, or when she goes upstairs, it increases to between 90 and 100, though even then it is not a source of special discomfort to her. The palpitation that she used to complain of so much bothers her no more, and the murmurs

that could be heard over the thyroid gland itself and over the carotids have entirely disappeared. The same satisfactory improvement is noted with regard to the other symptoms. The tremor has disappeared, the diarrhea is no longer a source of discomfort, the difficulty of breathing is no longer noticed, and the sensation of heat on the face and neck is a thing of the past. The patient is no longer nervous or irritable, she has a good appetite, and has gained in weight. Her menstruation is normal. Considering how much discomfort her menstrual disturbance occasioned her, this amelioration of itself is sufficient to make her feel that she is very fortunate in having had the operation done.

In order that you might have an opportunity of seeing one of these patients, I have had her come back to the clinic. It is now five years since I performed the cervical sympathectomy. The result must undoubtedly be considered an extraordinary success. The exophthalmos of the left side has completely disappeared, and there is only a very slight trace of it on the right side. The most careful examination fails to show the presence of any tachycardia, even after exertion and in spite of the excitement of coming to the clinic. Her pulse is now 84 to the minute, full, healthy, and regular. Before the operation you will remember that it was never below 120 a minute.

The goiter is scarcely to be seen, though some enlargement of the thyroid gland is apparent. The circumference of the neck immediately over the region where the thyroid gland is largest is thirty-four centimeters; before the operation it was thirty-eight and one-half centimeters. The scars of the operative incision lie along the posterior border of the sternomastoid muscle, and do not, when she wears a collar, produce any noticeable deformity. The scars of the healing by first intention are in the upper part of the wound particularly, where there was less manipulation; they are scarcely more than linear marks.

Case II.—We have here another patient who shows well how much permanent good can be accomplished by exsection of the cervical sympathetic on both sides. She is a young woman, aged twenty-eight years, who five years ago was suffering so much from exophthalmic goiter that she considered it worth the while to ask for operative relief. At the time of the operation she had suffered for several years from severe palpitation of the heart and an irreg-

ular rapid pulse, seldom below 110, often above 120 a minute. She had marked exophthalmos; there was an insufficiency of the internal muscles of the eye, especially on the right side, a distinct tendency to the overproduction of tears, and the dilated pupil so often seen in the disease. Notwithstanding the slight amount of exophthalmos in the case, von Graefe's sign—the failure of the upper lid to follow the movements of the eyeball—was present. Her most serious discomfort came, however, from the enlargement of the thyroid gland. This had affected especially the right lobe. The circumference of her neck was about thirty-seven centimeters. Over the thyroid there was a systolic murmur, and a distinct pulsation was palpable. The patient had most of the other symptoms of Basedow's disease more or less well marked. There was the characteristic coarse tremor, especially when the hand was held out and the fingers abducted. There was an intense sensation of heat and a tendency to excessive perspiration of the face and neck. The patient was nervous, irritable, incapable of long exertion, and generally in a depressed condition (Fig. 3).

The operation was performed in the midsummer of 1896. As in the previous case, a bilateral resection of the cervical sympathetic, including all three of the ganglia, was done. Especial care was exercised to remove the whole of the lowermost ganglion. The results of the operation were most satisfactory. The incisions healed by primary union, leaving only the linear scars that, as you see, are but slightly noticeable. The patient was able to leave the hospital within two weeks after the operation, and rejoiced in the absence of most of the symptoms that had been a source of discomfort for such a long time.

Within twenty-four hours after the operation all tendency to exophthalmos had disappeared, the pupils had regained their normal state and were no longer constantly dilated, and the movements of the eyes were perfectly restored. The patient's pulse during the first few days was not much reduced in frequency, but she did not feel the uncomfortable palpitation that previously had been a source of complaint. Before the operation there had been some little difficulty in swallowing, slight cough, and occasional hoarseness; but after the operation these disappeared. The circumference of the neck three days after the operation was thirty-five centimeters, that is, a reduction of two centimeters as the result of the sympathec-

tomy. As you can see now, after nearly six years, none of her symptoms have recurred, and she feels that she is not only relieved but permanently cured (Fig. 4).

Case III.—The third case is that of a young man, now about twenty-three years of age, who four years ago was operated upon for Basedow's disease of not very severe type. His symptoms were sufficiently bothersome, however, to make him feel that it would be worth his while to have the operation done. He is of rather nervous temperament, and, like most young people, impatient even of slight discomfort. The immediate result of the operation—a bilateral total resection of the cervical sympathetic—was most satisfactory. There was complete disappearance of the tachycardia and progressive diminution in the size of the goiter.

The patient's history has some points of interest. The family history is negative, but, as is so often the case in Basedow's disease, he seems to be one of those individuals who are susceptible to infectious diseases. He had most of the diseases of childhood, and while young was for a time in the hospital on account of "lung catarrh." Since then, some twelve years ago, he has occasionally coughed, but he has never had a hemorrhage. It was only about a year and a half before the operation was performed that he noticed the first symptoms of Basedow's disease. Without any apparent reason his neck became thicker, his collar uncomfortable, and the prominence of the anterior cervical region became noticeable even to his friends. Not long after this he began to have attacks of palpitation of the heart. For some months before the operation was done he complained of dyspnea. His appetite and digestion were unimpaired and his bowels were regular.

At the time of the operation the circumference of his neck over the struma was thirty-eight centimeters. At the base of the neck the circumference was forty-one centimeters. It was evident that both lobes and the isthmus of the thyroid were enlarged. The thrill and murmur over the thyroid were quite noticeable, and there was a distinct dicrotic sound, synchronous with the heart-beat. The thyroid gland was not adherent, and it followed the movements of swallowing very freely. At the slightest emotional disturbance palpitation of the heart developed, but usually it did not last for a long time. During an emotional storm his heart-beat was 140 to the minute, and it was somewhat irregular. During even slight

emotional disturbances the heart-beat was 120 a minute. At times, however, it was below 100. Exophthalmos was never marked, but there was a distinct rapid vibratory tremor.

The operation was done in sittings a fortnight apart. Both of the incisions healed by first intention, and the operation was followed by no noticeable reaction. The former tendency to disturbance of respiration and to difficulty of breathing when lying down disappeared at once. A month after the operation the neck was more than two centimeters—that is, about an inch—less in circumference than it was before the operation. It is now four years since the operation, and there has been no recurrence of the symptoms. His photograph taken before the operation is lost, but the one I present shows very well his present condition (Fig. 5).

Besides double cervical sympathectomy, only one other operative procedure for the relief of Basedow's disease has obtained any considerable favor. This is the removal of a part of the enlarged thyroid gland. A comparison of the results of the two operations will demonstrate the superiority of cervical sympathectomy. It must not be forgotten that there is considerable difference between the struma of ordinary goiter and the enlarged thyroid gland of Basedow's disease. In Basedow's disease the dilatation of the blood-vessels may give rise, as many operators know to their cost, to serious and even fatal bleeding. Sympathectomy has never been attended by any bad results. Sudden deaths as the result of strumectomy are not rare. The post-operative results of partial strumectomy are not always to be depended on. Mikulicz, who has had considerable experience with this operation, says that the nervous and psychic symptoms usually disappear first, and the patients are more comfortable than before operation. The tachycardia disappears after a time. Sometimes after many months a too rapid pulse may still be noted. The last symptom of all to be relieved is the exophthalmos, which may be noticeable even for years after partial strumectomy, and has in some cases persisted during the life of the patient. These three symptoms—exophthalmos, tachycardia, and the tremor—disappear in a distinctly less number of cases after strumectomy than after sympathectomy.

These results justify us, I think, in coming to the following conclusions: total bilateral resection of the cervical sympathetic is the most effective means for the relief of primary Basedow's dis-

case. It is, besides, the only rational operation if we concede that Basedow's disease is due to functional rather than organic changes in the system. Cervical sympathectomy is the only operation that relieves the main symptoms of the disease and at the same time lessens or removes the accessory conditions that have developed during the affection. The effects produced by this operation are such as bring about complete and lasting relief.

Simple sections, as also the stretching of the cervical sympathetic nerve, do not suffice to produce the complete and lasting results that follow bilateral sympathectomy. The milder methods of treatment only efface for the moment, but do not prevent the recurrence of those pathologic nerve impulses whose effect upon certain organs produces the symptoms of Basedow's disease. Even the extensive partial resection of the cervical sympathetic is only indicated in such cases of Basedow's disease in which tachycardia is not a prominent symptom. As a matter of fact, the extirpation of the lowest ganglion of the cervical sympathetic can be accomplished without very much difficulty and without adding materially to the danger of the operation. It seems foolish, then, to allow this lowest cervical ganglion to remain when we realize how much better results are obtained by the complete operation.

Personally, I feel it a duty to utter a word of warning with regard to the performance of operations upon the thyroid gland in these cases. While partial thyroidectomy is not a difficult operation under other circumstances, in Basedow's disease it is not only serious during and after the operation, but is often followed by serious consequences. In addition, notwithstanding the risk that the patient has been subjected to, there may be very little improvement either in the objective signs of the disease or in the subjective condition of the patient. In very bad cases of Basedow's disease, especially when the exophthalmos is of such prominent character as to threaten the eyesight, some operation will suggest itself. Cervical sympathectomy is then the best possible therapeutic method and the one that should be recommended and employed.

ACQUIRED UMBILICAL HERNIA IN THE ADULT

BY GEORGE G. ROSS, M.D.
Surgeon to the Germantown Hospital, and Assistant Surgeon to the German Hospital of Philadelphia

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The forms of hernial protrusions met with in the middle line of the abdominal wall are umbilical, ventral, and incisional. There are important points of difference between them, a knowledge of which is essential in arriving at a correct diagnosis and prognosis and in instituting treatment.

Umbilical hernia is that form which finds its exit from the abdominal cavity through a patulous umbilical ring, and is due to a stretching or rupture of the scar tissue forming the umbilicus. Ventral hernias find their exit through a weakened and overstretched linea alba and are due primarily to a separation of the recti muscles. Incisional hernia, as the name applies, follows abdominal operations and is due to a failure in healing of the fascia and muscles of the abdominal wall. Such hernia may protrude through the linea alba or through the fibers of either rectus muscles, the fault, however, being in the sheath of the muscle rather than in the muscle itself.

True ventral hernias occur most often above the umbilicus, on account of the breadth and relative weakness of the linea alba in this locality, while incisional hernias occur most often below. Considerable difficulty may be experienced in differentiating between umbilical and ventral hernia when the latter finds exit just above or below the umbilicus, unless one remembers that the umbilical variety comes through a distinct, more or less circular ring, with rigid, thickened edges. Of the three varieties of median abdominal hernias, umbilical is the most liable to serious accidents and complications and is attended by, probably, the highest mortality of all varieties of abdominal hernia.

Umbilical hernias may be congenital or acquired. The acquired variety in the adult presents so many points of difference from that of the infant that it is well to divide them for purposes of study.

The congenital form is due to developmental defects in conse-

quence of which the two halves of the developing abdominal walls fail to coalesce. In this respect it can be properly classed with other developmental defects, such as extrophy of the bladder, spina bifida, etc., and like them it offers extreme difficulty if not unsurmountable obstacles in its correction.

The infantile acquired variety differs from that of the adult in two main particulars: First, that it occurs in the early months of life in otherwise perfectly developed children, in whom, by reason of faulty closing of the umbilical ring or in consequence of the intercurrence of some condition, such as coughing, crying, constipation, etc., during the closing of the ring, the intra-abdominal pressure, by sudden violent and repeated muscular contractions, is unduly raised, causing the hernial protrusion. Secondly, that the infantile form has a tendency to heal spontaneously or responds to treatment other than operation, while in the adult form the tendency is toward ever increasing bulk and irreducibility, and it rarely, if ever, is remedied by means other than operation.

Adult acquired umbilical hernias may be classified under the following headings: reducible, irreducible, incarcerated with or without intestinal obstruction, and strangulated.

The umbilical ring is closed by the formation of scar tissue, the fibers of which are arranged in two series, the one circular, the other decussating from either side to meet in the middle line, thus forming a comparatively strong interlacing net-work of fibrous scar tissue. The lower half is much stronger than the upper, because below are the fibrous remains of the two umbilical arteries and the urachus, while above is the remains of the single umbilical vein. It is on account of the relative weakness of the upper quadrant that the hernia usually originates here.

The coverings of an umbilical hernia are usually very thin, and consist of skin, superficial fascia, and peritoneum. The fibrous tissue forming the umbilicus may be pushed in advance of the peritoneal coat and form a covering, but as a rule it is pushed to one side. The superficial fascial coat is so attenuated by pressure that it is often very difficult to recognize as a separate layer. The peritoneum, while always recognizable, is usually so thin that the contents may and frequently do break through it and become adherent to overlying skin and superficial fascia. The hernial ring formed by the edges of the abdominal fascia is always more or less thick-

ened, and is usually a thick, tough, gristly, unyielding ring of fibrous tissue.

Women are much oftener affected than men. The hernia rarely makes its appearance before the age of twenty-five years, and it increases in frequency with advancing years and adiposity.

The predisposing causes are adiposity of the abdominal wall and abdominal organs, lack of muscular tone, and relaxation of the connective tissue of the abdominal wall. Pregnancy, abdominal tumors, ascites, etc., which by decreasing the intra-abdominal space raise the pressure, favor umbilical and ventral hernias. Chronic constipation and chronic cough are also important factors in subjects who possess other predisposing conditions.

The exciting causes are those which give rise to violent muscular contractions, such as labor, straining at stool or menstruation, coughing, traumatism, violent athletic exercise, hard work, etc.

In the very early stages and in small hernias the omentum comprises the hernial contents. As the sac increases in size, the large intestine is frequently found, and in very large sacs the small intestine or the stomach in addition may be found.

Reducible hernias of the umbilical variety in adults are of comparatively uncommon occurrence, except in the very early stages of the protrusion. By reducible we mean a complete emptying of the hernial sac. In the vast majority of umbilical hernias omentum constitutes one of the hernial contents; and when we remember the marked tendency of the omentum to adhesive inflammation, when displaced or attacked by pathologic conditions, we can understand how rarely a completely reducible umbilical hernia is met with, except in the formative stages. Another important factor in favor of the reducible variety becoming irreducible is the tendency to increase in size by the increased intra-abdominal pressure due to adiposity of the abdominal viscera.

The irreducible variety is the one most commonly met with. It is the second stage of the reducible variety. In addition to the above-stated causative factors, traumatism must be included. The exposed position of the protrusion renders it particularly liable to injury, and irritation and consequent inflammation favor adhesions of the contents to the sac wall. In irreducible hernias the adherent omentum renders the opening permanently patulous, thus favoring the descent of knuckles of bowel. As frequently happens, such a

knuckle of bowel after its descent into the hernial sac cannot be reduced, and from the expansion of the gas in the bowel there will arise sufficient constriction at the neck to cause interference with the fecal circulation, thus giving rise to incarceration with intestinal obstruction. If the constriction becomes tight enough, by reason of the accumulated gases, fecal matter, etc., to interfere with the blood circulation of the involved portion of bowel or its mesentery, strangulation occurs.

In other words, umbilical hernia can be classified as follows:

Reducible.—Early stages of hernial formation.

Irreducible.—Later stage due to adhesions of omentum and possibly bowel.

Incarcerated.—With or without intestinal obstruction, an advanced stage of the irreducible variety. And lastly,

Strangulated.—An advanced stage of the incarcerated variety, with intestinal obstruction and circulatory obstruction.

We can have an incarcerated or strangulated umbilical hernia arising in the course of the reducible variety, but not so frequently as in the irreducible variety.

The signs and symptoms vary somewhat with the character of the hernia. The swelling appears as a rounded or transversely oval swelling protruding through the umbilical ring, and not above or below it. If the tumor be large, it will sag toward the symphysis pubis. It will not present a smooth convex surface, but will show distinct prominences of varying consistency, being elastic and tense in one place and hard and unyielding at others. Succussion is usually present, except in the old irreducible, incarcerated, or strangulated forms.

Pain is the most common subjective symptom; it is usually abdominal and cramp-like in character. It may be referred to the back or to the tumor. A heaviness and dragging sensation are frequently complained of. Tenderness is not usual, unless inflammatory reaction is taking place in the hernial sac. There are generally marked digestive symptoms, not unlike those of gastroptosis and enteroptosis. Attacks of nausea and vomiting with irregularity of the bowels are quite common.

That the prognosis is not favorable is readily understood when we consider the etiology, the usual course of the disease, and the marked tendency to irreducibility, incarceration, and strangulation.

The prognosis of strangulated umbilical hernia is probably the gravest of all forms of hernia. Incarceration with its associated intestinal obstruction is also a serious menace to the patient's life. The irreducible variety from its very nature, favoring incarceration and offering no hope of cure by palliative measures, is a serious problem for the surgeon to solve. Reducible umbilical hernia in the adult can frequently be controlled and kept reduced by a properly fitting truss. It must be remembered that even though the truss controls the protrusion there is no tendency toward spontaneous cure, and the danger of accident either from traumatism produced by the apparatus or from strangulation is ever present. To remove the element of danger the truss must be *always* and accurately in place. For should the patient lay aside the truss while in bed or in the bath-tub, and from some unexpected cause, such as sneezing, coughing, the muscular effort of sitting upright, etc., should the intra-abdominal pressure be suddenly raised, a mass of omentum and intestine may be forced through the opening and may become rapidly incarcerated or strangulated.

In the irreducible form the application of a retaining apparatus is of doubtful utility and is always attended with serious danger of traumatism. The very thin covering of the sac affords little or no protection to the underlying delicate contents.

The rational treatment, therefore, would seem to be some form of operation. Incarceration and strangulation offer no other means of saving the patient's life, and in the presence of these complications the outlook is extremely grave.

Operation for the radical cure of the irreducible variety is attended with unusual difficulties. Success depends not only on the correction of the existing condition, but also on attempting to overcome the etiologic factors.

The reducible form offers the simplest problem and the best success. The tumor is small, as is the hernial opening. The edges of the ring are not so thickened and rigid. The fascias are more elastic and amenable to manipulation. The recti muscles are not so attenuated, nor so widely separated. The patients are always in better general health and stand operation far better than they do after a long siege of the misery attending umbilical hernia. There is less likelihood of the remote causes of failure from fat emboli, fatty heart, etc. The wound is more likely to heal by first intention

in a recent reducible hernia than in one in which the tissues have been subjected to the pressure of the tumor, or a truss, or other retaining apparatus.

If these premises be correct, upon what ground rests the argument for delay and palliative treatment? What is to be gained? Your patient may live for a long time harassed by the misery of the unretained mass or the wearing of an appliance of doubtful utility and of some danger, only to come, in all probability, to a graver form of the disease and to one in which the hope of life is slight indeed.

In strangulation and incarceration of umbilical hernias as in all varieties of hernia, early operation offers the surest road to successful treatment. Efforts at taxis should be limited to a few trials and should be performed with great gentleness. If taxis fail operation at once is indicated. In strangulated hernia I believe taxis to be dangerous and useless—useless on account of the great probability of failure or, in case of success, the danger of reduction *en masse*. I have seen the sac of a strangulated hernia contain blood as a result of prolonged vigorous taxis. I have seen the strangulated bowel so injured by the traumatism of taxis that thrombosis of the mesenteric vessels resulted, giving rise to subsequent sloughing and perforation of the area of gut supplied by the thrombosed vessels.

The indications for radical operation in cases of irreducible hernia are far from being positive, inasmuch as we have to deal, not only with the local condition but with the systemic conditions which predispose to, or are active factors in, the production of the rupture. In view of the ever-present danger of incarceration and strangulation and the difficulty of controlling the protrusion by trusses or bandages, I believe that a radical cure should be attempted in selected cases. Excessive adiposity with muscular relaxation and atonicity, chronic coughs, chronic constipation, very large pendulous hernias with a correspondingly large opening are strong contraindications to radical surgical procedures. A more or less extended preliminary treatment directed against these conditions may permit of a larger number of favorable subjects for the benefits of operation.

As has been said, the time of choice for curative operation is during the stage of reducibility. If more sufferers from umbilical hernia would consent to operation at this time, I am sure that the

present high mortality from strangulation and incarceration would be materially reduced. At this stage of the disease there should be no mortality from the operation *per se* as there is no greater danger from opening the peritoneal cavity in this locality than attends the many operations performed elsewhere in the abdominal cavity.

In operating on strangulated or incarcerated umbilical hernia, it frequently happens that the patient's condition forbids an extended procedure. Under these conditions it is advisable simply to relieve the involved bowel and to wait until some future occasion for a curative operation. If the bowel be gangrenous and the patient's condition desperate, we can meet the indication by anchoring the bowel in the wound by sutures, thus making an artificial anus, and allowing the gangrenous bowel to slough away. Of course, it is preferable to make a formal anastomosis when possible. It is, however, better to have a live patient with an artificial anus, which can be closed in due time, than to perform a successful anastomosis and to have the patient succumb to shock as a result of the more extended operation.

In performing the radical operation, it is of importance to save the omentum if its condition permits, as it frequently is extremely useful in closing the hernial opening. By stitching the omentum to the peritoneal edges of the opening an additional layer of tissue is secured, thus materially strengthening the site of closure.

The following cases will serve to illustrate the conditions described above:

Case I.—Mrs. McG., aged forty-three years. Umbilical hernia of eleven years' standing; steady but gradual enlargement during the last year. Has had repeated attacks of incarceration with temporary obstruction, the symptoms being nausea, vomiting, and pain. Twenty hours before admission the hernia became incarcerated with marked symptoms. On admission the mass at the umbilical region was the size of two fists, irregular in outline, dull at some points and tympanic at others, and evidently contained strangulated bowel. Immediate operation. Six-inch incision. Sac freed and opened. It contained a large mass of adherent omentum and a knuckle of strangulated bowel. The ring being cut and the constriction thus relieved, the bowel reacted and was returned to the abdominal cavity. After removing the adherent protruding omentum, the ring was closed and the wound sutured. The patient recovered.

Case II.—Mrs. S. W., aged forty-nine years. Umbilical hernia of six or seven years' standing. During last two years has increased very much in bulk. Patient claimed to have suffered very little pain or inconvenience from the hernia. She had tried various forms of retaining apparatus without success. On the evening before admission, while riding in a street-car, she was attacked by a sudden coughing spell, and immediately thereafter had a severe crampy pain in the abdomen, accompanied by nausea and eructation of gas, but no vomiting. The pain and nausea continued, and at the time of admission she had in addition complete obstipation, not being able to pass flatus. The hernia was the size of three fists, the skin covering showing several areas of greenish black discoloration and two patches of ulceration. The sac was opened and the constriction relieved. A contained knuckle of strangulated bowel was gangrenous, but reacted slightly to heat and was returned to the abdominal cavity. The patient died of shock shortly after the operation.

Case III.—Mrs. J. McK., aged sixty years. Admitted with strangulated umbilical hernia of one week's duration. The mass was the size of a large orange, and showed patches of ulceration on the skin. The sac contained adherent omentum and a small knuckle of strangulated bowel. The patient died on second day of general purulent peritonitis.

Case IV.—E. P., aged fifty-seven years. The patient weighed at least three hundred pounds. Hernia of nine years' standing. Mass appeared after lifting a weight and was about the size of a fist. Operation for radical cure. The sac contained adherent omentum, but no bowel. The edges of the thickened ring were pared down and approximated by silk sutures. The muscles and skin were approximated with silkworm gut. The wound healed by first intention. She was allowed to get out of bed on the twenty-first day. As she started to walk to the chair at the foot of the bed, she sank to the floor, and was dead when the nurse got to her side. The probable cause of death was a fatty heart or fat embolus to the brain.

Case V.—C. F., aged sixty years. Hernia of seven years' standing, gradually enlarged. Twenty-four hours prior to admission she developed severe crampy pain in the abdomen, vomiting, nausea, and complete constipation. Her entire abdomen was very

tender. Her heart was weak; there was a ventral murmur and an irregular weak pulse. The constriction was relieved by rapid incision, nothing further being attempted. The sac contained omentum which was adherent. The patient died of shock a few hours after the operation. This patient probably had a strangulated knuckle of gut, which was relieved by the relaxation consequent to anesthetization.

Case VI.—Mrs. E. E., aged forty-seven years. Mother of eight children. Hernia of sixteen years' standing. Occurred during pregnancy, and was caused, she thought, by a fall. Radical cure. Adherent omentum was removed with the sac, and the wound closed. The patient made a rapid recovery.

Case VII.—Mrs. L. K., aged fifty-two years. A very stout woman who had borne nine children. Hernia of five years' standing. Ten months ago she had an attack of incarceration with intestinal obstruction. She was admitted with general abdominal pain, persistent vomiting, obstipation, and no flatus. The abdomen was somewhat tender, but not distended. She had been ill for one week with the above symptoms. Upon incision the sac was found to contain adherent omentum, but no bowel. The patient made a satisfactory recovery.

Case VIII.—Mrs. E. M., aged forty-five years. Very stout woman. Hernia of four years' duration. The hernia, which occurred during pregnancy, was at first not larger than a marble. On admission it was the size of a large fist. Radical operation. The wound healed by first intention and the patient made a satisfactory recovery.

THE GREATER IMPORTANCE OF THE ORGANS IN THE RIGHT, AS COMPARED WITH THOSE IN THE LEFT, LATERAL HALF OF THE ABDOMEN

A CLINICAL LECTURE DELIVERED AT THE NEW YORK SCHOOL OF CLINICAL MEDICINE

BY THOMAS H. MANLEY, PH.D., M.D.

Visiting Surgeon to the Harlem Hospital and Professor of Surgery in the New York School of Clinical Medicine

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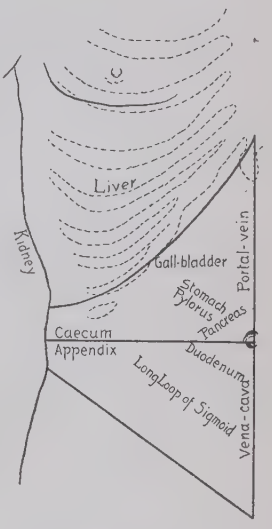
GENTLEMEN: On this occasion it will be my aim very briefly to call your attention to the importance of a practical study of regional anatomy as a preliminary step in the treatment of some few of those lesions of the abdomen and pelvis which of late years have largely come within the boundaries of surgical therapy, and to emphasize the fact that these are by all odds the most numerous on the right side. When we consider the anatomical situation of the principal abdominal organs and structures in the right side of the trunk, the importance and intimate relations of the structures here lodged, we can the better understand why we most frequently expect organic changes and functional derangements on this side, and also why symptoms may be so complex that differential diagnosis is attended with many difficulties.

Before we enter on this subject it is necessary that we attempt to define roughly the boundaries of the abdominal cavity, and right here we shall discover that in order to do this we must encroach on the thorax, as several of the most important organs in the abdomen —the spleen, the kidneys, the liver and gall-bladder—lie under and behind the thoracic wings. A distended stomach may mount up behind the lung, under the diaphragm as far as the nipple on the left side; and on the right side, a subphrenic abscess, a new growth in the hepatic substance, or a hypertrophied liver may rise posteriorly and laterally to a point high in the axillary space.

The base of the abdomen is supported by the sloping plates of the ilium, the hollow of the sacrum, and the musculomembranous floor of the pelvis. The solid osseotendinous structures of the spine powerfully defend it posteriorly, while the anterolateral muscular girth gives it support and protection forward.

In order to divide the abdomen into two equal halves we carry a line from the xiphoid cartilage to the pubic symphysis (Fig. 1). From the point above we carry the line in an oblique direction to the intervertebral disk below the tenth dorsal vertebra. The transverse limitation below cannot well be defined topographically, because of the heavy osseomuscular structures about the hips; hence a line carried horizontally across from the pubic symphysis to the lumbosacral joint will only approximately define the lower zone, or that part above the pelvis. This quadrangular division gives us a much more accurate comprehension of the topographical areas than a single quadrant, as we commonly view the surface of the abdomen, because some of the more important organs and structures are not included by the limitations of the quadrant.

FIG. 1.



Illustrating the topography of the principal organs in the right lateral half of the abdomen.

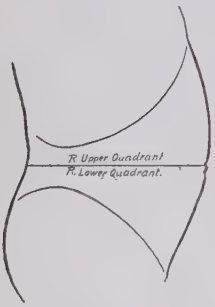
Now let us note briefly the striking difference in the importance of organs and structures in the right side of the lower trunk. In the two other large cavities, the cranium and the thorax, the organs are fairly symmetrical and are separated by well-defined septa. But in the abdomen there is no such division; moreover, in the right lateral half of the abdomen are lodged practically all the essential organs of digestion and elimination, or their tubular apertures.

Each lateral half of the abdomen below the costal borders and above the iliac crest may be most comprehensively defined as an oblique triangle, or a double quadrant, the base being the median line, the apex crossing through Petit's triangle, over the iliac crest below, and the upper border being represented by a line drawn from the free margin of the twelfth rib to the center of the body of the third lumbar vertebra. For our purpose this diagrammatic scheme will serve in a measure to show the larger number and the greater importance of the organs in the right side of the abdomen as contrasted with the left.

We will observe that a horizontal line drawn from the umbilicus

across to the second lumbar vertebra gives us an upper and a lower quadrant (Fig. 2).

Fig. 2.



Illustrating the division of the lateral half of the abdomen into an upper and a lower quadrant.

Principal Organs and Structures in the Upper Quadrant.—(1) The pylorus; (2) the first and second parts of the duodenum; (3) the head of the pancreas; (4) the cystic, pancreatic, and common bile ducts; (5) the main body of the liver, the gall-bladder; (6) the diaphragm and the pleura; (7) the vena cava and the portal vein; (8) the hepatic flexure of the colon; (9) the kidney and the ureter.

Lower Quadrant.—(1) The caput coli; (2) the cecal appendix; (3) the ileocecal valve; (4) the long loop of the sigmoid flexure.

It is therefore obvious that, if the vitals of the thorax are on the left side, those of the abdomen are on the right.

Now let us briefly note certain clinical peculiarities in various diseases on the right side which neither anatomical arrangement nor evolution in development will explain.

First, we will observe nearly every type of hernia of the groin much oftener on the right side,—according to McCready, in young adults ten per cent. more frequently; and Péan points to this area also as being the more common seat of neoplastic and infective lesions of the Fallopian tubes, the broad ligaments, and the ovaries. Displaced or floating kidney, statistics show, occurs on the right side more than five times as often as on the left. This difference has been explained by the close proximity of the organ to the stomach and liver; but this is essentially a female infirmity, and if the theory held good, it should apply equally to the male. In twenty-four cases of pyelonephrosis which have come to my notice, in all but two the right kidney was affected.

From a clinical stand-point the right side of the abdomen teems with interest, and it would probably be no exaggeration to say that at least ninety per cent. of all serious functional derangements and organic diseases have their starting-point in either the right upper or right lower quadrant.

Bearing in mind the numerous special large tubular and small canaler passages traversing these areas and their tendency to impac-

tion or stenosis, we must expect to find the preponderant causes of colic. The agonizing pain in nearly all varieties of colic is felt with great intensity over the epigastrium, but cautious palpation will frequently reveal the site of supersensitiveness and soreness over some distant tubular structure. The pain is reflex and finds expression in the solar plexus.

In the diagnosis of abdominal lesions an exact and practical knowledge of anatomy is indispensable, and we must always bear in mind that, while this cavity is topographically symmetrical, we should never overlook the wider physiological importance of those of its contents which lie to the right of the vertebral column.

Time will not permit of anything more than a very brief and incomplete survey of some of those pathological conditions peculiar to the area under consideration, but there are a few, nevertheless, which we may touch on with advantage.

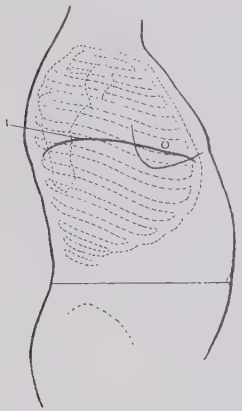
Let us begin with the upper quadrant and note here the aggregation of organs and structures which, when the seat of disease, will often test the diagnostic acumen of the most experienced and skilled.

In this zone we are struck by the close relations of important organs and structures,—of the pylorus, the duodenum, the head of the pancreas, the canaler passages, the gall-bladder, the kidney, the liver, the diaphragm, the pleura, and the lung. We note between all a very close communication of the vascular, lymphatic, and nervous supply, and here we find the vena cava grooving a passage for itself through the liver and the independent portal vein coursing upward under the head of the pancreas.

In this area we discover by far the greater number of neoplasms, benign and malignant, as well as parasitic and retention cysts, besides more maladies from the spread of infective foci than in any other region except the paracecal. Among the more common lesions encountered in the upper right quadrant are ulceration, perforation, or stenosis of the pylorus or duodenum, pyloric cancer, cysts of the pancreas, cancer or hydatid cysts of the liver, occlusion of the biliary ducts, distention of the gall-bladder, hepatic subphrenic abscess, hydronephrosis, and pyelonephrosis. In cases of incomplete descent of the cecum, or a long, wandering cecal appendix, the seat of disease, the pyogenic envelope may lie in immediate contact with the under surface of the liver or kidney, so that without

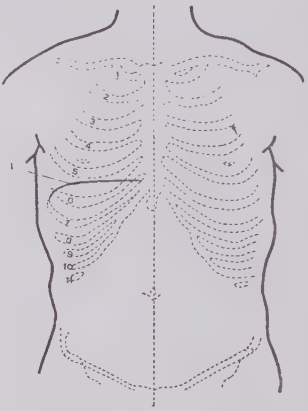
a most discriminating examination and a careful analysis of symptoms we may confound a suppurating appendix with an abscess of the kidney or liver (Figs. 3 and 4).

Fig. 3.



Illustrating the upper limit of the liver laterally.

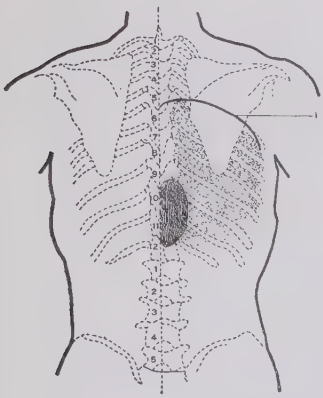
Fig. 4.



Illustrating the upper limit of the liver anteriorly.

Right here I will venture to digress briefly in order to recall to mind the remarkable similarity at times between the symptoms and signs of empyema on the right side and of a subphrenic or hepatic abscess. I wish to call your attention to this here because a mistake in diagnosis may cost your patient his life. I once saw an eminent Scotch surgeon proceed with an Estlander operation over the lower portion of the right lung in order to drain a suppurative pleurisy, but when he opened the pleura he found no trace of disease there, but a vast abscess of the liver crowding the diaphragm up to the axillary line as far as the lower border of the fourth rib (Fig. 5).

Fig. 5.



Illustrating the upper limit of a displaced lung in a large subphrenic abscess.

About a year ago I was invited to open the right pleural cavity for empyema. The patient was a vigorous young man, ill four weeks. The whole right side below the lower angle of the scapula was with-

out resonance or respiratory movement; he had suffered intense pain in the side and had great distress on coughing. His pulse was fleet and feeble and his temperature was 104° F. An aspirating needle immediately filled with pus when introduced in the fifth intercostal space between the axillary line and the spine. This seemed to decide beyond question the pleural location of the suppuration. I was advised by the attending physician to do an Estlander operation; but, as the tissues were being divided, the complete absence of tumefaction of the cellular tissues struck me as rather remarkable and excited my suspicion that there was something wrong in the diagnosis. Hence I removed but a half-inch section of the sixth rib. It was then quite clear that the pleura was entirely free, but in order to remove all doubt it was divided. The lung and pleuræ were quite normal, but the bulging diaphragm mounted fully two inches above the divided rib. An opening through the diaphragm disclosed a vast subphrenic abscess. The patient sunk the same night. An early and accurate diagnosis, with free drainage below, might have saved this life.

Sir R. Douglas Powell recently published the notes of a remarkable case showing the extreme difficulty sometimes experienced in distinguishing diseases of the liver from those of the lung on the right side. The case in point [1] was one of gas-producing hydatids of the liver extending up to the second rib. From the signs and physical examination it was thought to be a case of hydrothorax.

When the kidney from any cause undergoes notable augmentation in volume, it tends to sink downward and inward; we seldom mistake another organ for it. It is true that urine analysis when the ureter is patent may throw light on suppuration of the renal parenchyma; however, Kakales has recently reported a case of carcinoma of the pancreas mistaken for renal tumor; several similar mistakes are on record. I can find no case recorded wherein the enlarging kidney mounted upward and displaced the lung. But we should bear in mind that on the right side hepatic hypertrophy, tumor, or abscess may crowd the lung far upward and encroach on the pulmonary space.

It may be well in this connection to remember that the unnecessary opening of the pleural cavity under any circumstance whatever

[1] The Practitioner, February, 1902.

involves a grave complication, for the exposure of the lung by division of the pleura is sometimes as grave a procedure as exposing the brain. This is notably so in the adult.

The lower right quadrant of the abdomen is an area wherein we encounter pathological conditions which very frequently imperil life. Here lies the blind end of the long fecal pouch, the head of the colon. Here we find the common site of intussusception, through the ileocecal valve, in early life; and here is situated that anomaly of an organ without physiological uses, but only too often the source of serious pathological changes, the cecal appendix. On this side of the pelvis also—because, it is said, of their intimate relations with this functionless organ—we most often meet with septic disease of the Fallopian tube and the ovary in women; indeed, sometimes the tube and the appendix are diseased at the same time.

Malignant disease often seizes on the cecum or ascending colon. A cecum or sigmoid flexure filled with feces will widely distend the right iliac fossa.

We so commonly look for appendicitis as the source of all distress in the right lower quadrant that we may sometimes be led into erroneous diagnosis. Thus, on one occasion I opened on to a malignant perforation of the cecum which had been diagnosed as appendicitis; another time, a subperitoneal tubercular abscess; again I was able to shell out a fibrocystic tumor of the cecum which had produced all the ordinary symptoms of appendicitis.

In this quadrant occur fully seventy-five per cent. of the suppurative lesions of the abdomen. Here appendiceal ulceration, gangrene, or perforation most commonly occurs, although the position of the organ is very variable; here too we have perityphlitis, lumbar abscess, or suppuration of the ovary, tube, or broad ligament in the female. Moreover, it has been my experience to find every description of disease of the testis and spermatic cord, inflammatory, tuberculous, cystic, and neoplastic, with a positively greater frequency on the right side than on the left.

Visceral ptosis, as we might expect, is most frequent and accentuated in the right lateral areas of the abdomen. It occurs most frequently in women, especially the childbearing. In the course of a tempestuous, obstructed, or protracted labor the musculature of the abdomen may suffer serious damage by overstrain, contusion,

or laceration, or by a wide diastasis of the recti muscles. Following this there is a sagging or sinking forward of the abdominal contents over the pelvis. In those beyond the meridian of life the whole intestinal muscle suffers impairment in tone; the mesenteric ligaments and those supporting the solid organs tend to slacken and stretch. In visceral ptosis every organ in the abdomen shares in the disordered movement. The effects are most accentuated on the right side. The kidney takes the lead, both when healthy and when the seat of extensive disease. Renal ectopia is peculiarly in a large measure a right-sided condition.

Four years ago a patient came under my care suffering from pyelonephrosis; the kidney, distended to the size of a cocoa-nut, had sunk down into the right iliac fossa. The case had first been diagnosed as one of appendiceal abscess, but urine analysis and ureteral catheterization determined its true character, as confirmed by laparotomy. I have seen a distended gall-bladder so resistant, distended, and displaced that it was thought to be a floating kidney. This stony-hard tension of an abscess may lead us to suspect a solid tumor. A woman on whom I operated a year ago had a large tumor, the consistency of a scirrhus, which turned out to be the right kidney transformed into a bag of pus. It was at first believed to be a case of cancer of the liver, because the mass had moved downward and forward and was practically continuous with that organ.

In another case, an old man had a vast tumor continuous with the liver and extending well down into the right groin. A noted consultant declared the case to be one of hepatic cancer, evidently because of the tumor's fixity and marble-like hardness; but it turned out to be a case of hydatid cyst, readily relieved by free incision and drainage.

A tall woman of spare build came under my notice recently with a large movable tumor extending nearly down to the right iliac crest. It was thought to be a displaced kidney, the seat of malignant invasion; but a laparotomy proved it to be a case of hepatic ptosis; the kidney was found to be normal in volume and position.

The symptoms of abdominal diseases are very frequently exceedingly indefinite and confusing; this is notably the case when they are located in the extreme upper and inner limit of the higher right quadrant.

There are clinical phenomena more indefinite in connection

with many of the most distressing and serious maladies of the abdomen. The first is noted in the incipient stages of various pathological processes of the abdominal organs wherein there may be no pain whatever; but there generally is soreness, there is tenderness or hyperesthesia on various movements of the organs or the body; this is a symptom characteristic particularly of malignancy, though it is equally true of various types of inflammation, especially of the appendix.

Again, let any duct or tubular passage within the abdomen become suddenly obstructed by spasmodic colic, stricture, or impaction, vomiting with acute epigastric pain sets in.

Medical literature is remarkably silent on disease of the two separate venous systems of the right side of the abdomen: of the portal or hepatic veins. They appear to be comparatively immune to the various pathological lesions so common in the systemic veins. Varix and hematocele are not uncommon in the pelvic veins of women; but in the examination of the mesenteric veins of a large number of subjects I have never met with any variety of them or evidence of the effects of phlebitis in the portal, nor have we any evidence that the emulgent veins of the liver are ever separately involved by pathological processes. Being quite in the dark as to pathological processes here, we know but little of symptomatology, and, even if we did, might we hope to treat them effectively on other than empirical lines?

In obstructive changes to the portal supply of the liver, as in cirrhosis or malignant disease, a great enlargement of the pancreas or evidence of portal stasis or impediment is made manifest by marked distention of the epigastric veins; but I am not aware of any instance in which this condition has existed in consequence of pathological conditions in the walls of the portal vein itself, or of its two principal branches where they enter Glisson's capsule. Of course malignant disease of the pancreas may quite close this vessel as well as the pancreatic and common bile-duct.

To recapitulate it may be said:

1. From an anatomical aspect of the structures and organs of the abdomen it is obvious that, in the great preponderance of cases of injury or disease, those which involve the right side of the abdomen are more serious and frequent than those sustained by the left.

We will do well to remember that in the superior right lateral

quadrant the lower ribs completely conceal the right kidney and the entire right half of the liver; in other words, the thoracic walls not only enclose the pulmonary and central organs of the circulation, but also powerfully protect the solid organs in the abdominal cavity.

2. In infective or malignant lesions which have their origin in the pylorus, the first part of the duodenum, or the ducts of the pancreas or the liver, the symptomatology is so complex that definite diagnosis is often quite impossible without resort to all the latest resources of the physical sciences, conjoined at times with an analytical study of all the clinical manifestations.

3. Pyogenic accumulations in the right upper quadrant advance through the lymphatics in the subperitoneal tissues. They also occur from infection conveyed by the portal vein or from the hollow viscera. Dieulafoy insists that hepatic, subphrenic, and perirenal abscess or even suppurative pleurisy may occur consecutively from suppuration of the cecal appendix.

4. Pus formations, when of a subacute or tubercular character, may be of such great density, from extreme tension, as to impart the physical characters of a solid tumor, and what may add to the difficulty in diagnosis is the occasional entire absence of abnormal temperature.

5. Large hepatic or subphrenic abscess, in consequence of diaphragmatic pleurisy and the similarity of physical signs present, may without great caution lead us to believe that empyema exists, because the right pleural cavity, when so encroached on, is, except at the extreme summit, devoid of pulmonary resonance.

6. The gall-bladder lies under the costal borders; but when its duct is closed by stricture or impaction, it undergoes very considerable enlargement, with various degrees of displacement. When the common and hepatic ducts are free, icterus is absent. The distended gall-bladder becomes an indolent floating tumor, which may lead to numerous errors in diagnosis.

7. The normal kidney, we are lately led to believe, is so generally movable on the right side, especially in women, that in the absence of symptoms we may regard it as a normal condition. When, however, its range of displacement is considerable, the condition is pathological. In any diseased condition involving much increase in its density or volume it invariably tends to sink well

into the peritoneal cavity. Edebohls says that the pressure of a displaced kidney in the right side should be regarded as an etiological factor in appendicitis.

8. In the right lower quadrant we will discover a very large proportion of abdominal lesions at every stage of life. For reasons not yet well understood, this is the favorite site of all types of inguinal and crural hernia. In the right inguinal fossa lie the long loop of the sigmoid and the isthmus, marking the site wherein digestion ends and its residue enters through a guarded portal into a long reservoir, the colon; and here is found that anatomical relic, or functionless organ, the cecal appendix. Therefore, in inflammatory conditions dependent on a wide diversity of pathological states, intumescence, induration, and muscular rigidity may extend downward from the lower outer border of the quadratus lumborum, over the iliac fossa, below Poupart's ligament, into the pelvis, and inward as far as or beyond the median line. Here we will note first, what most commonly occurs, infective changes extending downward into the pelvis from a suppurating displaced kidney, a subperitoneal or lumbar abscess, or, what is most common, a localized suppuration extending from a diseased appendix. The pathological condition which ascends—ascending infection—in the male proceeds from the external organs of generation, in the female from diseases having their origin in the Fallopian tube, the ovary, or the broad ligament. A local peritonitis is provoked in all, with such confusion in the symptomatology that nothing less than a most discriminating and critical examination will enable us to reach an accurate diagnosis.

Pediatrics

ON THE CAUSATION, TREATMENT, AND PROGNOSIS OF CONVULSIONS IN YOUNG CHILDREN

A CLINICAL LECTURE IN THE COURSE ON DISEASES OF CHILDREN IN THE UNIVERSITY OF EDINBURGH

BY JOHN THOMSON, M.D., F.R.C.P. Edin.

Physician to the Royal Hospital for Sick Children and Joint Clinical Lecturer on the Diseases of Children, University of Edinburgh

GENTLEMEN: When you get into practice you will find that cases of convulsions in little children are among the commonest of the emergencies to which from time to time you are suddenly called. In most instances, probably, you will be too late to observe the details of the convulsion. If, however, you are in time, or if another fit begins while you are observing the patient, you will have an opportunity of noting a very striking succession of phenomena.

The onset and progress of a convulsive seizure has been admirably described by Dr. Charles West as follows: "When a fit comes on, the muscles of the face twitch, the body is stiff, immovable, and then, in a short time, in a state of twitching motion; the head and neck are drawn backward and the limbs violently flexed and extended. Sometimes these movements are confined to certain muscles, or they are limited to one side. At the same time, neither consciousness nor sensation is present. The eye is fixed and does not see,—the finger may be passed over it without winking,—the pupil is immovably contracted or dilated; the ear is insensible even to loud sounds; the pulse is small, very frequent, often too small and too frequent to be counted; the breathing hurried, labored, and irregular; the skin bathed in abundant perspiration. After this condition has lasted for a minute, or ten minutes, or an hour or more, the convulsions cease, and the child either falls asleep, or lies for a short time as if it were bewildered, or bursts into crying, and then returns to its senses, or sinks into a state of coma, in which

it may either be perfectly motionless, or twitching of some muscles may still continue; or, lastly, it may die in the fit."

A typical infantile convulsion, therefore, as you will observe, is very similar to an ordinary epileptic seizure. There are, however, a good many degrees of severity, and in some cases the movements are much less severe than in others. I do not wish to dwell to-day on the clinical details of convulsive seizures, but shall confine myself to the consideration of certain points with regard to the causation of the malady and the appropriate treatment and prognosis of various conditions in which it is met. When you are called to see an infant in a fit, the suddenness of the summons, the perturbation of the friends, the impossibility of examining the child fully at the time, and the large number of possible causes of the seizure combine to make the diagnosis of the case very difficult. It is often no easy matter, therefore, to answer promptly and satisfactorily the many questions which are hurled at you, one after another, by the anxious parents.

I propose this morning to discuss shortly some half-dozen of these questions and the data from which they have to be answered. The following are among those most likely to be asked:

I. What is to be done while the child is in the fit?
II. Is the convulsion likely to prove fatal?
III. What is it caused by?
IV. Is it likely to be followed by other similar attacks?
V. Will the child's future health, and especially his intellect, suffer?
VI. What is to be done to ward off further seizures?

I. *What is to be done while the child is in the fit?*—This has often to be settled before the cause of the seizure has been ascertained. If the fit is of very short duration, or if the patient is in a very feeble state of health, no treatment may be desirable. Generally, however, it is customary and beneficial to put the child into a warm bath, with or without mustard in it, or into a mustard pack, which has the advantage of requiring less movement of the patient. In preparing the mustard pack, a towel is dipped into a quart of tepid water with which a tablespoonful of mustard has been thoroughly mixed. It is then swathed round the infant's body, covered with blankets, and left on for from ten to fifteen minutes. Such measures are often all that is required.

If, however, the seizure lasts for more than five minutes, or if the fits go on recurring at short intervals, more active treatment is called for. Under these circumstances I generally begin by administering chloroform, which is quite safe and usually succeeds in quieting the convulsive movements. Chloral hydrate is another effectual remedy, but as the infant is unable at the time to swallow, it must be administered either hypodermically or by the rectum. Two or three grains (0.13-0.2), dissolved in water, may be given subcutaneously; or the remedy may be injected into the bowel through a rubber catheter. Given in this way, five grains (0.3) forms a suitable dose for an infant of six months, and ten grains (0.6) for one a year old. Morphin also is a very efficient drug in these cases. It may be given hypodermically,—one-twenty-fourth of a grain (0.0025) to a baby one year old. If this amount has no effect, it may be repeated in twenty minutes.

II. *Is the convulsion likely to prove fatal?*—With regard to this question, we may comfort the parents by assuring them that it is very rare for a baby to die in a first convulsion. Death may, however, take place in the fit if the child is in an extremely exhausted state, if there is a serious intracranial condition, such as cerebral hemorrhage, or if a laryngeal spasm or failure of the respiration sets in, as is apt to happen in feeble rickety children.

III. *What caused the fit?* is a question that suggests itself when the immediate treatment of the attack has been attended to and the parents have been reassured as to the probability of recovery.

Now, the causes of convulsions in little children are almost innumerable. It is difficult to classify them at all accurately within a reasonable space, but to help our memories an attempt to do so may be made as follows:

A. Predisposing Causes.—1. Age. 2. Rickets. 3. Inherited nervous constitution.

B. Determining Causes.—1. Local disease, such as injury or change in circulation of the brain or its membranes. 2. General morbid conditions, such as poisoning, fever, etc. 3. Peripheral irritation.

A. Predisposing Causes.—1. *Age.*—The younger the children the more apt are they to suffer from fits from any cause. They get much less liable to this manifestation of disease after they are two years old.

2. *Rickets* is a very common cause of convulsions. In those cases in which it operates, a distinct improvement of the rickets under treatment is accompanied usually by rapid cessation of the convulsive tendency, although obvious peripheral causes of irritation persist.

3. *An inherited nervous constitution* is another important cause. In some children and some families of children a fit will arise from a slight elevation of temperature or from a trivial peripheral source of irritation which would do no harm to less excitable individuals. This predisposition to convulsive seizures often occurs to a slight and, less commonly, to a very severe degree.

Last year I met with a marked instance of this family predisposition. I was asked to see a baby of sixteen months who was dying of bronchopneumonia and had had a great many fits. On inquiry I found that the child's father had had two brothers who had died in infancy in convulsions, while two other brothers had each a child who suffered from fits. Of seven other children in the family to which the patient belonged, four had died from various diseases, but all after a series of convulsions, one had had one convulsive attack but had grown up healthy, and only two had no history of fits.

B. Determining Causes.—1. *Local disease, injury, or change in circulation in the brain or its membranes.*—In almost every case of serious organic disease of the brain there may be convulsions at some stage. Thus, we meet with them in cases of abscess, tumor, concussion, hemorrhage, tubercular and non-tubercular meningitis, microcephalus, and in all the other numerous developmental and inflammatory brain lesions which produce idiocy.

We encounter them also in cases in which the cerebral circulation becomes engorged from any cause, as in whooping-cough and in some forms of congenital heart disease; and they occur too with cerebral anemia, such as accompanies severe diarrhea and general hemorrhage.

2. *General morbid conditions* are often responsible for convulsive attacks. A sudden rise of temperature is very apt to be followed by convulsions in many children, while in adults it might probably cause rigors or delirium. Thus, such attacks are sometimes met at the onset of pneumonia, scarlet fever, measles, erysipelas, malaria, influenza, and even chicken-pox in exceptional cases. In

uremia, of course, they are not uncommon; and a large number of poisons, metallic and vegetable, may give rise to convulsions.

3. *Peripheral irritation of nerves* sets up convulsions in some children, especially in those who are suffering from rickets. In this way convulsions arise from an undigested meal in the stomach, from scybala in the bowel, or from difficult dentition, middle-ear inflammation, phimosis, burns, or other painful local lesion.

Diagnosis.—Having thus indicated the main types of causes, we may now proceed to consider how we are to tell which of them is to blame in any special case.

To do this we, of course, examine the patient thoroughly and draw any inferences we can from his temperature, from the rate and character of his pulse and respiration, and from the state of his nutrition and strength. We examine the fontanelle, and look for signs of paralysis past or present and for indications of the presence of organic disease of any kind. We must also investigate possible sources of peripheral irritation, inflamed gums, excoriated skin, etc.

Then we have to consider the health and behavior of the child immediately before the onset of the convulsion, and the mode of onset and the exact characters of the convulsion itself. A convulsion occurring suddenly in the midst of apparently good health, for instance, may indicate the presence of a hitherto latent cerebral tumor. If there is fever, the attack may be the commencement of one of the exanthemas or of a pneumonia. A history of headache, vomiting, and other cerebral symptoms is of course of great significance. If there has been an opportunity for injudicious feeding on the part of the infant, acute indigestion may be suspected, but in such a case malaise and drowsiness will probably have been noticed before the seizure. Any new or unknown medicine recently taken may fairly be suspected as a possible cause.

The character of the fit itself is often important. If, for example, the seizure consists of a very slight passing loss of consciousness, —a sort of petit mal,—this in children, as in adults, often indicates serious organic disease of the brain. If there are convulsive movements without loss of consciousness, there is probably a cortical lesion present. Should the fit be followed by prolonged stupor, this points to organic disease of the brain or membranes.

The age of the patient is often a great help in arriving at a

diagnosis of the cause of the fits, because certain varieties of disease leading to convulsions occur only, or mostly, within certain periods of infantile life. But of this later.

The consideration of the three other questions I have mentioned —(IV.) "Are the convulsions likely to recur?" (V.) "What effect, if any, will they have on the child's future health, and especially on his intellect?" and (VI.) "What is to be done to prevent their recurrence?"—together with some further points of differential diagnosis, may be best considered together, as I take up certain more or less well marked types of convulsive seizures. I have not time to deal with all sorts of convulsions, but shall confine myself to a few considerations regarding four or five well marked and common types of disease of which such attacks are characteristic.

1. When convulsions occur in a new-born baby we naturally suspect them to be due to some injury received during birth. In many cases of difficult birth (breech presentations, forceps deliveries, protracted labors) there is intracranial hemorrhage (according to Cruveilhier, one-third of all children dying during labor show this). If the hemorrhage is situated about the base of the brain and is large in amount, it is generally fatal; if, however, it is over the vertex, it may be very large without causing death. In these cases fits frequently occur during the first week of life, or at any rate before the end of the first fortnight.

Diagnosis.—We are usually aided in our diagnosis of such cases by the history of difficult labor. Often also there is a history of prolonged asphyxia at birth and difficulty in getting the respiration established. In some cases we find signs of continued intracranial irritation, such as opisthotonos or general muscular rigidity, but often the muscles are extremely relaxed. Any sign of paralysis is in favor of this diagnosis, and a bulging fontanelle is also significant.

Treatment.—The treatment of such cases consists merely in keeping the patient as quiet and warm as possible and in attending in every way to its nourishment. Sedative medicines are of little value.

Prognosis.—If there is reason to believe that there is an intracranial hemorrhage of any size, the prognosis must be extremely guarded. While it is truly wonderful what amount of physical

injury new-born children sometimes survive without any apparent bad effect, a large proportion of mentally defective children certainly owe their defect to injury occurring at birth. It may be comparatively late in childhood, however, before the full effect of the cranial injury becomes apparent.

2. A second class of convulsion cases sometimes met with in early childhood includes those in which a dyspeptic infant develops convulsions when food disagrees very much with him. These cases may be met with soon after birth, or indeed at any time during infancy.

Treatment.—In this class of cases also sedative drugs are of small service. It is not the convulsions, but their cause, that we have to deal with. We begin with a dose of calomel, and proceed to a thorough regulation of the diet, so as to get rid, if possible, of the irritation which sets up the attacks. For this purpose nothing equals breast-milk, and the employment of a wet-nurse is superior to any artificial dietary. Should this be out of the question, peptonized milk or some other substitute for human milk must be tried and persevered with. Stomach-washing and alkaline remedies are also very useful.

The *prognosis* depends on the progress of the dyspepsia. There is no likelihood in these cases that the brain will be seriously or permanently damaged.

3. A third group of cases is sometimes met with in which convulsions appear in very young babies, but in which no organic or peripheral cause can be found. Provisionally we may call these, cases of "idiopathic convulsions." To this class I wish especially to draw your attention, because I think that they are often not treated with sufficient energy.

Symptoms.—The fits begin sometimes during the first week of life, and generally within the first month or two. They are not accompanied by any other symptom pointing to organic brain disease, and there is usually no obvious digestive or other abnormality which can be thought to form a source of peripheral irritation. There may be only two or three attacks a day to begin with, but usually they increase steadily in number. There are sometimes twenty, thirty, or even forty, in twenty-four hours; and this may go on for weeks.

Treatment.—In these cases expectant treatment with or without

doses of bromide is of no use; and treatment of the alimentary canal for possible obscure causes of local irritation is mere waste of time. What is required is to get the infant as soon as possible thoroughly under the influence of chloral. As the individual fits are usually of short duration, the chloral can easily be administered by the mouth. For a baby a week or two old, one grain (0.06) may be given every two hours, and for older children two grains (0.12) is not too large a dose. This is continued until the fits have entirely ceased for from six to eight hours or more, and if not speedily effectual, the dose can be increased until the child begins to get too drowsy to swallow his milk. When the fits have entirely ceased for some time, the interval between the doses is gradually lengthened. Usually within three or four days the medicine can be discontinued without any return of the convulsions.

Prognosis.—In these "idiopathic" cases the prognosis is generally very good. It must, however, be guarded to some extent, because, as the infants are usually very feeble, they are apt after recovering from the fits to die from some comparatively mild intercurrent disease. In most cases, however, the recovery is as complete as it is rapid, and there is no return of the disease. When the fits have been numerous, it is not uncommon for the child to remain in a stupid and drowsy state for weeks after,—partly owing, no doubt, to the effect of the medication. This is apt to raise doubts as to the effect of the attacks on the intellect; but, fortunately, these are not well grounded. The condition clears up completely in time, and the child's mental development is quite unaffected.

4. The commonest cases of convulsion met with in ordinary practice are certainly what used to be called "teething fits," though now they are more generally spoken of as *"rickety fits"* from the part rickets plays in their causation. The presence in a child of progressing rickets produces in many instances such an increased sensitiveness to peripheral irritation that slight causes of this sort, which ordinarily do little harm, give rise in them to convulsive seizures. This form of convulsions occurs later than those I have already spoken of,—usually between the ages of six months and two years. It is met with more frequently in the colder seasons of the year, and is especially frequent in spring. The patients are not generally in an advanced stage of rickets, but they show signs of the disease in a rather early and progressive form.

Diagnosis.—We are helped in recognizing this type (and consequently in deciding the treatment) by noting the absence of other obvious causes of fits and the presence of rickets. If, as often happens, we find present also one of the other neuroses usually associated with rickets (facial irritability, laryngismus, or tetany), we can be pretty certain of our diagnosis.

Treatment.—The treatment must be energetically directed against the rickets, and, if fully carried out, its results are extremely satisfactory. We begin of course by inquiring into the state of the digestion. The use of calomel and antacids is often extremely beneficial. As soon as possible, however, we must get the diet regulated on anti-rachitic lines, and begin cod-liver oil, with or without phosphorus. It is also important to see that the child has plenty of fresh air, and especially to institute cold douches once or twice daily. For these the infant is placed in an inch or so of warm water in front of a fire, and a large jugful of cold water (60° to 65° F.) is promptly poured over his shoulders and back. He is then taken out at once and rubbed till he is dry and warm. Under this regimen the child's health rapidly improves and all tendency to convulsions soon disappears.

Prognosis.—The prognosis as to future developments in these cases is usually quite good, even when the fits have been numerous. I have seen only two children with this malady grow up to be mentally defective, and it was doubtful in both cases whether the fits were really to blame for the deficiency.

5. In the last set of cases of young infants with convulsions of which I wish to speak, the convulsions are one (and perhaps the only) morbid sign of serious cerebral defect.

Symptoms.—In these cases, to begin with, the seizures are often of the nature of petit mal. The infant who has often been hitherto regarded as normal is noticed to take sudden startings from time to time. These often consist of a momentary forward inclination of the head, shoulders, and lower limbs. They are succeeded by loss of consciousness for a few minutes, and perhaps by a little stertorous breathing. After this the child often cries as if in much distress. Sometimes it is the sudden and apparently causeless crying which first draws attention to the attacks. These seizures vary in frequency from time to time, but they generally tend to become more frequent as the child grows older (for some years at

least). They are also apt to become more violent as times goes on, and finally to give place to regular epileptiform attacks. They are a symptom of a serious cerebral disease, but they are also themselves a serious cause of deterioration of intellect. The more frequent their onset the more stupid the infant becomes; and if they cease for some months there is generally a marked improvement noted in his intellectual condition.

Diagnosis.—The diagnosis depends on the character of the fits themselves and on the presence of any sign of defective cerebral development, such as an abnormal size or shape of the head, a peculiar demeanor, a marked backwardness in noticing things or in acquiring ordinary co-ordinated movements.

Treatment.—The result of treatment in these children is very discouraging. Bromide may sometimes be of use. Generally, however, when given in doses large enough to affect the fits it interferes considerably with the child's general health. Anything, however, which produces a distinct improvement in the child's general condition may diminish the number and severity of the attacks. Thus a change to the country or the timely administration of a tonic may diminish or stop them for many weeks. In some few cases thyroid substance has a good effect.

Prognosis.—The outlook for the children is very bad. The condition which originates the fits is always one which seriously interferes with cerebral development and the chance of even slight permanent improvement is very small indeed.

Into the consideration of the many other types of convulsions met with in infancy and childhood I have not time at present to enter, but I hope I have said enough to indicate to you something of the general principles of treatment of such cases and to show you the importance and interest of the subject.

Orthopedics

THE TREATMENT OF WEAK FEET AND FLAT FEET

A PAPER READ AT A MEETING OF THE DISTRICT OF COLUMBIA MEDICAL SOCIETY

BY A. R. SHANDS, M.D.

Professor of Orthopedic Surgery in the Columbian University, Washington, D. C., and in the University of Vermont

It is not generally appreciated by the medical profession at large that the condition of flat foot, which is the source of almost untold suffering, is produced by many causes that are thoroughly amenable to treatment long before there is any danger of flat foot resulting. If there were a more thorough understanding among the profession regarding the causes of this malady, much suffering would be relieved and thousands of distorted feet prevented. It is the purpose of this paper to call attention to the chief causes producing this trouble and to the treatment to prevent as well as to correct flat feet. Surely here is a large field for the orthopedic surgeon: to instruct how to prevent this very painful affection, an affection that seriously handicaps many persons in the pursuit of their occupations and in thousands of cases absolutely prohibits persons from engaging in occupations for which they are otherwise admirably fitted in every particular. A great many papers have of late been written by orthopedic men calling attention to the importance of preventing the more common deformities that are likely to result from diseases of various kinds, thereby doing away with the necessity of having to correct them. Several years ago I read a paper before this society on the importance of mechanical treatment of infantile paralysis to prevent the deformities following in the chronic stage of the disease. So far as I know, nothing has been written on the prevention of flat feet. It is to this subject that I propose to confine this short paper, and to discuss both the prophylactic and the curative treatment.

This brings us to the consideration of the causes of acquired flat feet. Congenital flat feet are not to be considered at this time, although they constitute a very important class; but they do not entail the suffering nor handicap the individual to the same extent that the acquired form does.

The static variety of acquired flat foot is most commonly seen in young adolescents at the time of approaching puberty. It appears in persons of weak muscular development whose occupations necessitate greater strain on the muscles and ligaments that support the arch of the foot than they are able to stand without giving way. Rapid growth favors it, as the structures are unable to bear the extra work. Many authorities tell us that about seventy-five per cent. occur between the ages of fifteen and twenty years. This is well supported by the fact that shop-girls, young waiters, barbers, and nurses are especially prone to it. The cause is that the weak ankle and foot are unable to endure the strain of the superincumbent weight; there is a disproportion between the body weight and the apparatus for sustaining it. Lorenz, from his most thorough investigations, concludes that the trouble is due to an alteration in the positions of the astragalus, os calcis, and scaphoid, which is simply an excessive pronation of the foot at the mediotarsal joint.

A painful flat foot often follows severe injuries about the ankle, such as Pott's fracture, the falling of heavy weights on the top of the foot, etc. Several years ago I saw a gentleman who dropped a piece of iron weighing eight or ten pounds on the dorsum of his left foot. No fracture resulted, but the foot became weak and painful, and in the course of a few months he had a well-developed flat foot.

I have observed a large number of painful feet and even flat feet resulting from an ordinary sprain of the ankle. The cause which I have always assigned for this result is that, following the injury, the ligaments and tendons supporting the arch are stretched and much weakened by the serous effusion that follows the injury to the blood-vessels surrounding them. If this condition is not appreciated and the arch not supported properly from the very beginning, a painful or flat foot is very likely to follow as a remote effect of the sprained ankle. I have encountered many painful and weak feet following apparently slight injuries to the ankle and foot.

Several years ago I had a patient past middle life, a clergyman by profession, who had suffered with a painful and weak foot for about five years when he came under my care. He had sprained his ankle in being thrown from a carriage. He made a fairly good recovery from the acute symptoms, but the remote effect was a very weak foot, and often a very slight twist of his ankle would cause so much trouble that he had to use crutches for several months. Then he would get about fairly well until another twist would compel him to take to his crutches again. This had been his experience for the five years before he came under my care. The treatment that I adopted consisted in the application of a Whitman flat-foot plate, which in about a year relieved his condition entirely. It has now been about eight years and he has had no further trouble with that foot. The diagnosis in this case was simply a weak arch; there was no depression whatever to the arch. He undoubtedly would have had a flat foot had his occupation been such as to compel him to bear much weight on his foot.

The most important ligaments that are injured are the inferior calcaneo-scaphoid and the calcaneo-astragaloid; the latter does more to sustain the keystone of the arch than all of the others: all the ligaments in the sole of the foot contribute to the support of the concavity of the foot, but the calcaneo-astragaloid is the most important. In severe flat foot the range of motion of the ankle is limited, the normal range being from seventy-five to eighty degrees, while in an average flat foot it is from thirty to forty degrees.

If a bared foot is placed upon the floor, it will be seen that the inner border of the foot becomes altered and the internal malleolus is apparently nearer the floor. A certain amount of this pronation is normal; the excess is checked by the ligaments and muscles. Hence it is seen that any impairment of the strength of these structures will aid in the production of flat foot. The muscles that assist in supporting the arch are those which pass around the inner malleolus to be inserted into the anterior part of the foot: they are the tibialis posticus and tibialis anticus, with the peroneus longus assisting in a measure.

Recognizing the assistance that these muscles are to the ligaments, you can readily appreciate how long-standing, when those muscles are strained to their utmost, will tire them, thus throwing more weight on the ligaments and in time causing them to give

way. The attitude of rest, a position so often assumed by persons whose occupations keep them constantly on their feet, favors the production of flat feet. The active position of the foot is adduction; the position of rest is abduction; this relieves the muscles, but puts more strain on the ligaments.

All kinds of ill-fitting shoes put the weight-bearing mechanism of the foot at a disadvantage and impede its normal function. This is a very prevalent source of painful feet as well as of weak arches and even flat feet. Analogous to this form of flat foot, due to weak muscles, is the affection known as weak ankles, most commonly seen in growing children, which is due to a weakness of the muscles already spoken of as aiding in the support of the plantar arch. If this condition is not recognized and those muscles are not supported, this deformity is apt to follow, causing a permanent distortion of the astragalus. If the weight-bearing surfaces of this bone are not held in their normal relations to the articulating bones during the growing years of the child, the relief of this normal pressure will surely cause the bone to develop in an abnormal shape and thus produce a permanent flat foot. Shoes that are tightly laced about the ankles of a growing child interfere with the normal development of the muscles intended partly to support the foot, and cause weak ankles and even flat feet. The proper adjustment of shoes to children is very important, for the remote effect of ill-fitting shoes is often very serious.

Another very fruitful source of painful and flat feet is acute articular rheumatism of the ankle and foot. This affection as a cause of flat foot is but little noticed by the authors of text-books, many of whom do not even mention it. My observation has been that it deserves a very prominent place in the category of the causes of this affection. I have been able frequently to trace this as a cause and could report numerous cases to support my assertion. These cases come to me with the history of having been treated by numerous doctors, quacks, osteopaths, etc., for rheumatism for months and years. These are the cases that go the rounds. They inform me that they have been told that they have chronic rheumatism which followed an acute attack. It is true that they did have an attack of acute articular rheumatism, but it is not true that they now have chronic rheumatism. Their trouble is the remote effect of the acute attack. All of us are familiar with the immense

amount of swelling accompanying acute articular rheumatism. It is at this stage that the trouble occurs. During these attacks the infiltration of all of the structures—ligaments, tendons, fascia, etc. —is so extensive that they become weakened from the boggy serous exudate, and as a result, after the swelling of the rheumatism subsides, the ligaments and tendons are not able to support the bones of the arch of the foot in their normal relation to one another. So it is that if the arch is not supported by some applied mechanical means, some permanent injury is going to result and that is most often flat foot. If the convalescent is so fortunate as to have an occupation that does not necessitate his bearing his weight on his feet, he may escape; on the other hand, if he is less fortunate and has to return to his work before the structures have regained their normal condition, sooner or later he is going to have either a flat foot or a weak and painful foot that will be called chronic rheumatism. In this connection I beg you to bear in mind that chronic articular rheumatism in *one* joint is an extremely rare condition.

A weak or flat foot is likely to follow osteitis of any of the tarsal bones or phlegmons about the sole of the foot; here the trouble is produced in the same way by the boggy serous infiltration of the supporting structures of the arch, causing them to become weak and allowing the superincumbent weight to change the relations of the tarsal bones one to the other, thus putting pressure on surfaces that are unaccustomed to bear it.

Shaffer some years ago called attention to the fact that a large number of flat feet with normal arches were caused by a contracted Achilles tendon. Contraction of the heel-cord may result from many causes: probably the most common cause is infantile paralysis of mild degree. It also follows fractures about the ankle when the heel-cord is injured. As a result of long confinement of the foot in splints during repair of the fracture, the tendon becomes permanently contracted, and this causes the patient involuntarily to evert the foot when he begins to walk. This puts pressure and strain on structures that are unaccustomed to bear them, and as a result the arch ultimately becomes lowered or remains painful. In cases of fractures above the ankle the foot should be immobilized in dorsal flexion to prevent contraction of the heel-cord, and thus this malady will be prevented.

Diagnosis of flat foot is easily made from the objective symptoms

and needs no extensive remarks. The condition of a weak foot is not so easy. A weak foot may be regarded as the preliminary stage of a flat foot, and if it is recognized early and properly treated flat foot should be avoided.

A line let fall from the center of the knee-cap should normally just touch the outer side of the second toe; any deviation of this line from that point is very apt to indicate a weak condition of the supporting structures of the plantar arch. The eversion of the foot is the most common position of a weak foot. Inversion or " pigeon-toe" is often due to a weak foot and can be cured by supporting the foot.

From a diagnostic stand-point it should be borne in mind that an everted foot need not have a depressed arch; just the opposite is most often the case. The pain is most prominent before the arch gives way, indeed after the arch becomes obliterated pain is not a very prominent feature unless the victim of such condition has overtaxed his foot. Flat-footed people do not suffer much pain unless their occupations are such that they are on their feet a great deal.

The prophylactic treatment of flat foot should be begun just as soon as the condition of weak foot is recognized, or just as soon as any affection is present that is likely to impair the function of the structures above described that support the arch.

I am fully convinced that the great virtue of the method of treating sprained ankles by strapping the foot with adhesive plaster strips lies in the fact that the equable pressure furnished by this form of tight bandaging prevents or relieves the serous infiltration into the supporting tendons and ligaments of the foot and supports them until nature has overcome the injury and restored them to their normal condition. Many a person has been saved from having a weak and painful foot by this method of treating sprained ankles. It is a common thing to meet a patient who has what might be called a chronic painful foot which followed an ordinary sprained ankle and who has been treated for rheumatism. It is very satisfactory to treat one of these cases after he has gone the rounds, for by properly supporting the arch of the foot a prompt cure is effected. Several years ago Dr. S. S. Stone referred to me a lady who sprained her ankle about two years before I saw her, and had suffered more or less ever since. She had *acute* attacks of severe pain extending

up the entire course of the sciatic nerve, and had been treated for rheumatism, neuritis, and sciatica by different doctors from time to time, with no relief. Upon examining her foot, I found that she had a perfect arch, but I could easily produce severe pain by putting the foot through the normal arcs of passive motion. By causing her to walk towards me, I discovered that she walked with her painful foot everted. The treatment in this case consisted in strapping the foot with adhesive plaster strips and putting a soft pad in the arch of the foot for support to the mediotarsal joint. This treatment was continued until all acute symptoms had subsided, and I then made for her a Whitman's flat-foot plate which in course of time effected a permanent cure.

The treatment of flat foot is simple, but its application must vary according to the degree and duration of the deformity. The normal motions of the foot must be restored and maintained until the weak structures have regained their normal strength. In all cases the patient must be first provided with a proper shoe. The ordinary shoe that conforms to the fashion of the day never conforms to the normal condition of the foot. It usually cramps the toes and ball of the foot, and the high heel throws more strain upon the mediotarsal joint and thus adds to the weakness of the structures supporting that joint. One has only to watch the motions of the toes of a barefooted person to appreciate how nature is handicapped with the feet encased in ill-fitting shoes. The proper shoe is the one that conforms best to the normal condition of a normal foot and gives greatest freedom of motion to all the structures of the foot. In order to relieve the strain on a weak foot, the sole of the shoe should be slightly raised on the inner side. This puts more weight on the outer side of the foot.

In the mild form of weak and painful foot, about all that is necessary is to apply the adhesive plaster strips, a process that is familiar to all of us, and then support the arch with a soft pad fitted so as to conform to the arch as near as possible. I apply the pad over the adhesive plaster, holding it in place with two strips of adhesive plaster, and over all apply a snug roller bandage. This dressing is removed once a week, increasing the thickness of the pad each time until the arch is somewhat exaggerated. This process is repeated until the painful symptoms have subsided, and then the treatment is continued by leaving off the adhesive plaster

and applying a soft pad attached to an inner sole, being careful that the pad is high enough to support the arch in its normal position.

In the severe forms of this malady the process described is preliminary to the application of a support more rigid than the soft pad, and for these cases I use the Whitman flat-foot plate. I have yet to see a case of weak and painful foot or flat foot that cannot be benefited by this device; a large percentage are permanently cured. The proper application of this plate in the severe cases is quite an art. The plate is made over a cast of the foot; the art in making the plate consists in cutting away the cast so as to get the most pressure where it is needed. Unless the cast is properly shaped the chances are that the results will be disappointing. The surgeon should prepare the cast, and the instrument-maker's duty is only to make the plate as directed.

There are many cases that are so severe that measures more heroic than I have described will have to be adopted. These are the cases in which the arch is depressed and rigid and so painful on passive motion that an anesthetic will be required. In those cases under an anesthetic the arch is forced into an over-corrected position and held there by means of a plaster-of-Paris splint. The foot should be well covered with cotton before applying the plaster of Paris, for if this is not done the pressure of the plaster on the bony prominences will give great pain. The first plaster bandage is usually left on for about three weeks, and when removed permanently a Whitman plate is applied and the patient wears a proper shoe with sole built up on the inner side.

There are various cutting operations that have been advocated for the relief of the severe forms of flat feet. I have had no experience with them, as I have never encountered a case that could not be relieved by the means I have described.

In conclusion, I will repeat that the prophylactic treatment of flat foot is the most important, and if all patients could be so fortunate as to have it properly applied there would be but few acquired flat feet to treat by the more heroic method. Just as soon as there is present an affection of the foot that is likely to weaken the supporting structures of the mediotarsal joint, that joint should be supported until the normal conditions are restored, and there is no better method of doing this than by strapping the foot with adhesive plaster and putting a soft pad under the plantar arch.

Special Articles

ON FUNCTIONAL REVERSION AND ITS IMPORT IN MEDICAL PRACTICE

BY A. F. A. KING, A.M., M.D.

Professor of Obstetrics and Gynecology in the Columbian University, Washington, D. C., and in the University of Vermont

About twenty years ago a distinguished naturalist, the late Professor Elliott Coues, began one of his introductory lectures before the medical class of Columbian University, in Washington, D. C., by writing upon the black-board, "Evolution is true; its application is universal."

If the doctrine of evolution be *not* true, then the subject of this paper can be nothing more than the "baseless fabric of a vision;" if it *be* true, then it is hoped the paper may be considered a reasonable attempt to explain one of the applications of evolution to the practice of medicine.

In following up the principle of functional reversion to ancestral conditions, I hope to deduce from it systematic methods of treatment, which modern experience has proved to be of the most intrinsic value, and which, if the doctrine of evolution had been used as a working hypothesis, might have been thought out centuries ago; and therefore might have forestalled the many useless systems of treatment which have been in vogue from time to time, to the great detriment of mankind and the discredit and ridicule of the medical art.

It need scarcely be said that the intrinsically valuable methods of modern practice, generally speaking, are hygienic rather than medicinal; still there are *some* medicines which long have been, and long will remain, of real value.

The beneficent action of these valuable medicines and the beneficent effect of suitable hygienic treatment can both be explained by the theory of functional reversion to ancestral conditions. To

demonstrate this relation is the task I now undertake,—difficult to obtain, and perhaps hypothetical, as some of the evidence must necessarily be. Complex as the human body appears before the anatomist, it is really composed of but two things, or two systems: first, the nervous system, and, second, its instruments and machinery. The nervous system directs, governs, and controls; the rest of the body is directed, governed, and controlled by the controller. The ability to control judiciously is an inheritance, acquired step by step through long lines of ancestry. Easier in health, more difficult in disease, yet even under the impress of adverse and abnormal conditions the nervous autonomy of the human organism, for the most part, acts wisely either for its own benefit or for the benefit of its race.

One of the corner-stones in its government would seem to be this principle of functional reversion to previous conditions, under circumstances requiring it. Thus, to illustrate my meaning with a familiar example, it is a mandatory requisite in the life-career of every normal man that about one-third of his time should be expended in a functional reversion to the conditions of intrauterine existence,—namely, sleep. Alike in the sleeping fetus and the adult, we observe the same folded arms and flexed legs, the same closed eyelids, the same abolition of thought and motion, etc. So deeply has this requirement of sleep become a necessity for our well-being, that habitual insufficient sleep deranges all the functions of both mind and body, and complete insomnia leads to suicide. So imperative is the demand—handed down to us through ages of ancestry—that a certain portion of our time should be devoid of its customary activities and, lapsing into a lower grade of existence, revert to the conditions of intrauterine life, that without this temporary functional reversion we could not live. And wisely does the autonomy of the nervous system decree that when sleep is required the man becomes sleepy, and, in obedience to long-established ancestral law, voluntarily abdicates the sphere of his higher activities and reverts to a lower plane of living.

Again, all of us inherit (as a race) certain common tastes and distastes; we have our likes and dislikes. No one knows why, except that we were born so. We like to hear the sighing of wind through trees, its distant moaning in the pines, and the pattering of rain upon the roofs of our houses. These produce in us an emo-

tion difficult to describe, a serious feeling, and yet a pleasant one which we respect and revere. With a sort of friendly cosiness these sounds suggest home, they conduce to reverie, the prelude of sleep, and yet are so indefinite as to seem but an echo from some far-off shore.

Why this inherited taste? Is it not because our not very remote ancestors lived in one-story huts? They went to sleep at night listening to the dropping of rain and the flacking of tree-branches upon the roofs of their dwellings, and the sighing of the forest breeze lulled them to slumber. To us it is the pleasing vibration of a cord in the harp of our ancestral memory, a temporary reversion to feelings of an age long past and gone.

Again, most of us are born with an innate love for hunting, fishing, shooting, and trapping, and probably for the reason that our not very remote ancestors—before the development of agricultural pursuits—obtained a living by these means: it was their chief occupation. So, when the business man of to-day breaks down from overwork, his physician orders him to the woods, the mountains, or the sea-shore, and directs that he spend his time fishing or hunting,—a temporary reversion to the occupation of his ancestors; and it does him good and restores him to health.

In more pronounced pathologic conditions, such as acute inflammations, fevers, etc., we should not go far wrong if we defined the most modern (and the best) treatment of acute disease, as a functional reversion to the conditions of infancy. The strongest and most muscular man, when he becomes the victim of acute disease, must be treated as if he were a child, and in the majority of cases this treatment will secure his recovery, and without it he would be likely to die.

Note that the infant performs no muscular or mental work; it does not talk, nor does it laugh, or in other ways exhibit evidence of strong emotion; its procreative function is quite in abeyance; it must be kept warm and protected from cold; it must take no solid food, but have at short intervals an exclusively liquid diet, chiefly milk and water; it must have plenty of sleep, and, to this end, silence; helpless itself, it needs an attendant mother to supply its wants; it uses no tobacco; it takes no drugs. Should the skilful clinician of to-day be asked to write down his directions for a case of acute disease, he would follow almost verbatim these require-

ments for a normal infant, and he could scarcely devise a better course of treatment.

This will become more evident if we conceive opposite directions to have been given, or rather to have been obstinately pursued voluntarily by the patient himself; that is to say, the laboring man, though ill, insists on continuing, or is compelled by circumstances, to continue, his muscular work; the intellectual man persists in continuing his studies, and the parliamentarian his talk. Instead of staying at home, the invalid goes out in the cold; instead of restricting his diet, he continues his solid food; and in lieu of sleep, he keeps up his late hours, etc. Under such a method of treatment, perhaps with the addition of drugs, the very worst results might be expected. It is exactly the opposite of what the governing nervous system instinctively prompts the invalid to do, viz., relinquish the exalted functions of his manhood and revert for a time to those of infancy.

The use of tobacco and erotic pleasure may seem absurd when considered with regard to infancy, but it should be noted that both these indulgences instantly disappear in adults with the advent of acute disease, and their spontaneous return is a sure sign of convalescence and recovery.

Every child requires a mother, and thus in modern medical practice we have followed Nature's plan, and have supplied the adult who has reverted to infancy with an artificial one—the trained nurse, the greatest blessing of modern times.

Thus far we have spoken of reversion to infancy during illness, of reversion to intrauterine life during normal sleep, and of their advantages.

Let us now go farther back—to the ages of geologic time. According to Lord Kepler, man has inhabited the earth seventy millions (70,000,000) of years, and the ancestral forms from which he is derived about four hundred millions (400,000,000) of years.

Whatever environing conditions existed during those vast periods of time must have left upon the bodies of our ancestors, and thus indirectly upon us, an indelible impress, of such a character as to be incapable of complete obliteration even at the present epoch.

Now, since we have found a temporary functional reversion to infancy and to intrauterine life advantageous, beneficial, and, withal, pleasant, and since a reversion to the life-habits of our

near-by hunting ancestors gives us a like pleasure and benefit, it would seem to follow that if we could in any way find out the conditions that existed in the various ages of geologic time and reproduce them artificially, we should have at command still further measures of benefit and pleasure, and perhaps those very measures in particular which would beneficially affect and most deeply influence the fundamental elements of our constitution.

Surprising as the statement may appear, this has already been done. In the school of clinical experience we have unconsciously reproduced these artificial reversions to remote ancestral conditions by the use of medicines, only, however, by those few medicines, be it noted, which always have been, now are, and always will be used, because of their intrinsic value, and of which I now proceed to speak.

First of these is opium. Opium, alcohol, and their allied compounds all come into the same class. It is needless to dwell upon their value in medical practice; this is admitted.

All races of men, in every stage of civilization, and in all parts of the world, are pleasantly affected by opium and by alcoholic drinks; in fact, there is constant danger that those who use these things may become opium-eaters or alcoholic dipsomaniacs.

If one ask why this should be, the answer is, We were born so; but the origin of this hereditary acquisition, so deeply grounded in our constitution, has never been explained. Functional reversion supplies the explanation. These medicines produce, artificially, bodily conditions that naturally existed during that remote period in our history when our ancestors, during vast periods of time, lived continuously, generation after generation, in the highly carbonized atmosphere of the so-called "carboniferous era," an atmosphere whose wealth of carbon dioxid produced the gigantic vegetation which formed the coal-beds, and which, until thus depleted of its very great excess of carbon, was unfit to support life in any breathing animal; and there must have been long ages of time, even after the beginning of this gradual depletion, in which only animals requiring a low grade of respiration could exist.

Now, opium, alcohol, and their allied preparations all have the effect of inhibiting respiration; they restrict the breathing function, and, in overdoses, are said to paralyze the respiratory center. Liebig states that a single glass of whiskey will at once lessen the

climination of carbon dioxid from the lungs. By large doses of opium we can reduce the number of respirations, almost at will, to twelve, ten, or even less, per minute. In opium poisoning the chief remedy is artificial respiration. And, strangely, the restrictions of respiration thus produced do not occasion dyspnea and distress, but rather give pleasure and enjoyment—the man is really luxuriating in that reduced sensibility to pain and consequent relief from suffering, due to his highly carbonized venous blood, which was enjoyed by his ancestors of the carboniferous epoch, by the partial anesthesia consequent upon their highly carbonized atmosphere; and, for so many ages did this environment of his progenitors continue, that we can no more expect to abolish from the man of to-day his love for opium and alcohol than we can expunge from his anatomy the spinal column that he has inherited from an endless line of vertebrate ancestors.

In opposition to this view it will perhaps be said that the idea is strained and far-fetched, and that if it were true, pain could be stopped by simply holding one's breath, and without any medicine whatever. I reply that we instinctively *do* hold our breath during great physical pain—during, for example, the intermittent agony of intestinal and other forms of colic—and that the analgesic influence of consequent increased venosity of the blood relaxes the muscular spasm and eases the pain. During the severe uterine colic which we call labor-pains, the woman often holds her breath until she is blue in the face. During the epileptiform convulsions of puerperal eclampsia, and in simple epilepsy, when the respiratory muscles have become immovable from rigid spasm and cyanosis results, the partial anesthesia of venous blood relaxes the spasm and ends the fit. We accomplish the same purpose by morphin, which experience has proved to be the remedy *par excellence* for puerperal convulsions.

During that short interval which usually occurs in child-birth between the extrusion of the head and the delivery of the body we observe the face and head of the infant to become more or less livid from cyanosis, the respiratory function of the placenta having been curtailed by uterine compression, etc.; but in this we recognize Nature's benign anesthetic to lessen the shock of transition from the warm, soft, dark, and silent cavity of the amnion into a cold, hard, noisy, and illuminated world. So, then, the admission that

we can relieve pain by holding the breath does not belittle, but rather confirms, the view that opiates do the same, and that they thus translate us artificially to the ancestral conditions of the carboniferous age.

In the evolution of the embryo the last direct and intimate link between the present and the carboniferous eras would seem to be abruptly severed by the process of birth, for up to that time no part of the circulation contains pure arterial blood; it is always mixed arterial and venous blood. In the case of still-born children the insensibility is complete from exaggerated cyanosis due to compression of the funis, etc., and restoration is only possible by artificial respiration, when the reviving influence of oxygenated blood again awakens the nerve-centers from their almost fatal sleep—exactly as we restore an opium-poisoned patient by artificial respiration.

Hardly second in value to opium and alcohol is another group of medicines which have been long used with great benefit, and which the changing fashions and follies of therapeutics can never displace; this is the haloid group, the chlorides, iodides, and bromides. We should find it difficult to practise medicine without these drugs, and without the sodium chloride we could not live, since it is a necessary ingredient in every fluid and tissue of the body.

Why are these haloid salts so beneficial, and under certain conditions of disease so necessary, to restore health? It is because by resorting to them we are reverting to the use of proximate principles of nutrition that were largely and constantly used every day during a period far preceding the carboniferous era, and perhaps many times as long, when our remote ancestors were inhabitants of the sea, when they swam constantly in a solution of sodium chloride and fed constantly on sea-weeds, sponges, etc., containing abundance of iodine and bromine.

Though so long ago, the organism still retains its fundamental property of being pleasantly and beneficially influenced by these ancestral principles of a by-gone age. Indeed, iodine has recently been found in the leukocytes of the blood and in the thyroid gland and other structures; perhaps it is a necessary requisite for complete metabolism even in health, but in constitutional conditions of depraved nutrition it becomes necessary to revert to the haloid salts

in larger quantities, and the mysterious beneficial result is usually spoken of as an "alterative" effect, whatever that term may mean, —a sort of altered nutrition from bad to good.

Still another medicine of great value, and the use of which will probably never be abandoned, is quinin and its allies. Twenty-six years ago Dr. Henry Bence Jones[1] discovered in the blood and tissues of guinea-pigs and man a substance which he called "animal quinoidine," and which he says "possessed *all* the chemical and optical properties of quinine, including fluorescence." Substances having a similar blue fluorescence,—viz., esculin and fraxine,—have been found in the barks of the horse-chestnut and the common ash-trees respectively; and recent advances in our knowledge of the influence of colored light upon bacteria indicate that the increase of violet rays (such as is produced by fluorescent substances) tends to destroy various forms of toxin-producing organisms in the blood. Dr. Dawson F. D. Turner, in discussing the treatment of cancer by phototherapy,[2] says, referring to Finsen's experiments, that, while the Röntgen rays appeared to have no bactericidal effect, "ultraviolet light had a marked effect in destroying bacteria."[3]

Leaving out of consideration for the present the question of destroying pathogenic microbes by ultraviolet light, and asking ourselves now the more simple and relevant question, why human organisms of the present epoch are affected beneficially by quinin and other preparations of bark, the answer would seem to be in accord with the functional reversion hypothesis—that it is a quality handed down to us from some distant age, and from some remote branch of our genealogic tree, when those ancestors were bark-eating animals. As the presence of the haloid preparations in our bodies stamps us with the seal of our marine ancestors, so Jones's "animal quinoidine" reveals the escutcheon of the bark-eating branch of our family tree. Perhaps these "blue-blooded" progenitors were assisted in their struggle for existence against malarial infection by the blood fluorescence produced by certain barks, just

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[1] Med. Times and Gazette, London, August, 1866, pp. 163–167.

[2] Lancet, November 15, 1902, p. 1328.

[3] See my own papers on the destruction of the malarial parasite by ultraviolet rays of fluorescent light, etc., in the American Journal of the Medical Sciences, February and June, 1902; also Washington Medical Annals, March, 1902, vol. i., No. 1.

as in the man of to-day malarial fever is prevented and cured by the fluorescence caused by Peruvian bark, as shown by Drs. Rhoads and Pepper.[1]

Much as we all like the sweets of life, it is still true that our appetites are increased and digestion improved by some sort of bark bitters before meals. Can this be a functional reversion to those of our ancestors who were able to digest the crude bark itself?

Another class of medicines of inestimable value, and the use of which can scarcely ever become obsolete, is the phosphatic group —phosphate of lime and allied preparations. Daily experience proves their utility. Why should they be beneficial to men of the present age? It is because by resorting to them we are supplying artificially proximate principles of food that were always abundantly present in the diet of our ancestors and in all the branches of our family tree, but which custom has inadvertently almost eliminated from the dietary of civilized man. The main supply of phosphorus and the phosphatic salts comes from the consumption of bones, brains, and the shells of cereal grains. Animals that consume other animals eat them (if sufficiently small) bones and all; and in devouring animals larger than themselves, the ends of the largest bones are gnawed off and swallowed after persevering efforts with apparent relish. Fish-eating fish, bird-eating birds, snake-eating snakes, and many other carnivora swallow their prey entire. The herbivorous and graminivorous beings swallow all parts, shell included, of the cereal grains on which they feed. Civilized man, on the contrary, takes only the pure starch of his cereal foods, the grain-shells having been sifted out as bran, and swallows only such parts of an edible carcass as can be delicately separated with knife and fork. Thus the brans and the bones, the sources from which our ancestors for many ages received their supply of phosphorus and phosphate of lime, and which entered so largely into the composition of their own bones and nervous systems (as well as ours), have, by the usages of civilized life, been left out. By artificial means we restore them, but in doing so, be it noted, we are reverting to conditions that naturally belonged to nearly or quite all of our vertebrate ancestors, in whatever age or ages they may have lived.

Gautier has recently discovered arsenic in all the tissues of

[1] Pennsylvania Hospital Reports for 1868, pp. 269–280.

civilized man, and considers it to be a normal ingredient of the body. Under what environment of geologic time, and in what branch of our ancestral tree, arsenic became one of the desirable proximate principles of nutrition my present knowledge does not enable me to suggest.

With regard to iron, another valuable drug, we know that it is an ingredient in many of the animal and vegetable foods upon which our nearly related ancestors subsisted; and, there is reason to believe, was also a necessary proximate principle in the metabolism of our more remote marine ancestors. Prof. A. B. Macallum in a paper "On the Origin of the Relation of the Inorganic Elements to Protoplasm," [1] remarks that "iron has been more abundant in the ocean in the early geologic periods than it is to-day, if we can rely on the interpretations which geologists and mineralogists put on the beds of iron ore found in the Archæan and Cambrian" rocks. Thus the remarkable effect of iron in simple anemia and chlorosis is explained by its supplying to the protoplasm of the blood-corpuscles an element to which they had been accustomed, and on which their anabolism had depended during long ages of geologic time: in fact, a reversion to the iron-habit acquired during this extended period.

One further application of the evolution doctrine, as illustrated by functional reversion, and I close.

It is generally admitted that ontogeny (the history of the embryo) is an epitomized recapitulation of phylogeny (the history of the race). Geologists recognize three great epochs in the organic history of the earth, namely, the primary, secondary, and tertiary epochs. Corresponding with these three epochs are the three stages in the evolution of vertebrate organisms, namely, fishes, characterizing the primary epoch, reptiles the secondary, and mammals the tertiary, the fishes being lowest in organization, the reptiles next, and mammals the highest.

Now, if we divide the epitome of embryologic development into three chapters, the first third of pregnancy would represent the age of fishes, the second third the age of reptiles, and the third third the

[1] Prof. Macallum's paper was read before the American Physiological Society, December 30, 1902, at the Convocation Meeting of the American Association for the Advancement of Science held in Washington. He kindly permitted me to copy the above quoted from his yet unprinted MS.

age of mammals. Assuming, now, that the embryo would require for its nutrition during these three periods proximate principles of the same kind as were necessary for the metabolism of the corresponding three great divisions of ancestral organisms, it is an easy inference that the diet of a pregnant woman should contain during the first (fish) period an abundance of the haloid salts, during the second (reptile) period, corresponding to the carboniferous era, a supply of alcohol and opiates, and during the third (mammal) period, a supply of phosphorus or phosphate of lime. So there may be further subdivisions of these periods, and also of the ancestral tree, in which bitter barks or arsenic would be advisable during embryologic development.

In support of this hypothesis it may be stated that in the mysterious hyperemesis of pregnancy (in those cases, at least, not due to uterine disease or displacement) which are called neurotic, and in which, after many remedies have failed, the case is at last cured abruptly by the fortuitous use of some particular food, or medicine, and which no one can explain,—I say, in these cases, among the most successful remedies we *do* find the iodine and the bromine preparations, opiates and intoxicating drinks, phosphate of lime, the simple bitters, and arsenic.

Whether we should succeed better by giving these several groups of medicines at periods in the embryologic epitome, corresponding to the three great epochs when our ancestors were, respectively, fish, reptiles, and mammals, remains to be investigated.

The application of this functional reversion idea to cases of hyperemesis gravidarum is, of course, based entirely upon the assumption that the governing nervous system impels the woman to vomit the things she does not require for the evolution of her embryo, and keep on vomiting until she finds the things she does require for that purpose. Could we assist her by giving the haloids during the first three months, epitomizing the period of our marine ancestors; wines and anodynes during the second three months, epitomizing the carboniferous era of our reptilian ancestors; and phosphates during the third three months, epitomizing the period of our nearer mammalian relatives?

Finally, I am fully aware that I have presented this subject in a very superficial manner, and without the support of experiment and observation which modern science properly demands. But if

the presentation contain a new thought, if it indicate a new path in a region yet unexplored, with sufficient attraction to incite others to think and to explore along the same lines, it may accomplish some good.

Perhaps it is something to have at least broken a gap in that stone wall against which modern investigation stops when asked why men are born with certain proclivities to be influenced in a special manner by particular medicaments, even though the fields on the other side of the wall appear barren and unprofitable.

Perhaps the careless medical student who forgets the hygienic treatment of acute disease as presented to him in the college curriculum may find it easier to remember by recalling the words of an old and once popular song, in which the idea of functional reversion is embodied:

> "Backward, turn backward, O Time, in your flight!
> *Make me a child* again, just for to-night!"

And should he improvidently forget the trained nurse, lines from the same source may again refresh his memory, to wit:

> "Mother, come back from the echoless shore,
> Make me a child again, just as of yore."

Nothing, perhaps, generally speaking, is more ephemeral and vacillating than what may be called "fashionable therapeutics": new medicines come, are prescribed with avidity, have their day, and depart, but of those medicines which turn back the flight of time and translate us by reversion to ancestral conditions, it may be said:

> Drugs may come, and drugs may go,
> But these go on forever.

THE GENERAL PRINCIPLES OF EMBRYOLOGY

BY J. W. BALLANTYNE, M.D., F.R.C.P.E., F.R.S. Edin.

Lecturer on Midwifery and Diseases of Women, Medical College for Women, and Examiner in Midwifery in the University, Edinburgh, Scotland

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To many, perhaps to most, medical men embryology is a closed book, or at best a book which if opened is soon shut again, its contents being unintelligible, or nearly so. The language of embryology, so to say, is superficially taught in our colleges, and the textbooks on the subject require far more painstaking study than is usually given to them if they are to become in any degree luminous. And so it comes about that most general practitioners reconcile themselves at length to the idea that embryology is not for them, that it is the preserve of the Embryologist (with a big E), and that it contains much that is mysterious, occult, abstruse, recondite, not to be apprehended by the ordinary mind. It is not so much a part of the great realm of medical science, capable of cultivation and likely to yield fruit, but rather a great labyrinth built upon an outlying portion of that same realm within whose bewildering and intersecting and intercommunicating series of passages the explorer can hardly hope to do aught but wander helplessly. So at least it seems to him, and having little liking for aimless perambulations through such labyrinthian complexities, he walks in other paths of medical knowledge.

I cannot hope in this article to popularize the study of embryology—that were a labor of Hercules. I trust, however, to be able to show that, after all, the subject is not quite so recondite as has been imagined, and that there are some clews to guide us through its labyrinthine maze. I need hardly say that I address myself to the general practitioner, and not to the skilled embryologist.

Embryology, if the word be used in a restricted sense, is the science which treats of the origin and formation of the parts and organs of the embryo. It is the study of the anatomy and physiology of embryonic life; for it has to do with the description of the parts which make up the embryo, or its *anatomy,* as well as

with the way in which these parts, often after passing through several intermediate forms, become the permanent organs of the embryo, or its *physiology*. It is not possible to separate the anatomical from the physiological part of the subject. It is quite possible, and, indeed, it is easy, to describe the organs and parts of the adult body, *e.g.,* the individual bones of the skeleton, without referring to their functions, for they are fully formed and scarcely differ, save in size, at the various periods of life. To attempt, however, to describe the parts of the embryo is really to picture these parts as they appear at the various stages in the development of the embryo,—in other words, it is to represent their progressive elaboration. When an embryologist speaks of, say, the face of the human embryo, not one, but several, pictures pass as visual images before his mind's eye; he is thinking of the five processes springing from the base of the primitive cerebral capsule and gradually growing round the cavity of the stomodœum and ultimately uniting to form the facial framework. A living picture is, as it were, passing impressively before him with all its equipage. Embryology is, or ought to be, a kinematographic representation, a life-like reproduction of the original moving scene of the whole embryonic period of antenatal existence. The embryo is not like a finished piece of machinery which can be studied both in action and at rest; it is unfinished, for when it is completed it becomes *a fœtus;* it is like a piece of machinery in process of construction; and its activities consist in a ceaseless progress towards a termination which shall also be a completion. The physiology of the embryo is really its formation, almost the only functions it has are nothing else than self-construction and self-elaboration.

This, then, is a preliminary conception which it is necessary for us to form regarding embryology if that subject is to be in any degree understandable by us. We must banish from our minds preconceived notions regarding anatomy and physiology derived from the study of the adult, and think of an anatomy and a physiology run, as it were, into one and constituting both the structure and the function of the embryo. To form is the function of the embryo, and its anatomy is not a single structure, but a series of structures and organs passing by insensible gradations one into the other.

It need hardly be pointed out that Embryology is not always

employed in this restricted sense. It is sometimes used as meaning the study of the whole period of antenatal life from impregnation up to birth, and the word *embryo* has been given to the new organism in the uterus both in the embryonic and in the fœtal period, or has been employed as a synonym of *fœtus*. Such a usage of terms is sadly lacking in scientific accuracy. Here the word embryology is used as meaning the science which treats of the origin and formation of the parts and organs of the embryo. The term *embryography* might perhaps be enlisted for this restricted use, leaving embryology free to be employed in the wider sense; but it is undesirable to introduce many names. Embryology deals with a part of antenatal existence which, although somewhat short (five to seven weeks), is so crowded with events of such importance as to cause it to take rank above all the other periods of life, antenatal and postnatal. It includes the study of all the changes through which the embryo passes, from the appearance of its first rudiments in the embryonic area up to the transformation of the "transition-organism" of five weeks into the recognizably-human embryo or neofœtus of seven weeks. During the remainder of antenatal life the unborn infant is to be known as a fœtus.

The general principles of embryology lie buried somewhat deeply; they are far from the surface, and not easily to be reached or recognized when reached. It is difficult for the mind to picture a stage in the life of the organism when almost the only manifestation of vital activity is of the purely constructive kind, when, in other words, the framework of the body is being built up. So complex, also, is the process that certain portions of it, notwithstanding the laborious researches of keen and able embryologists, are still imperfectly understood or only guessed at. It is even more difficult to discover the laws which govern embryological processes and to trace the general principles which underlie so complex a series of manifestations. One is almost driven to speculate whether, after all, there are laws regulating the mysterious metamorphoses of the embryo, whether, indeed, the parts do not fall together in kaleidoscopic fashion, and confusion happen somehow to give place to order. But reflection assures the investigator that there must be laws, otherwise he is forced to state that embryology differs from all the other sciences in being uncontrolled by rule. Yet in no other part of biological study is it so difficult to trace

and analyze the laws and their results. Events move so rapidly, form succeeds form and phase follows phase with such swiftness and with so much partial superposition, that nothing less than an arrestment of the succession of phenomena at various stages would serve to enable the embryologist to trace the procession of occurrences. Such an arrestment sometimes occurs, and so pathology comes to our aid to help us to understand the intricacies of physiology; but the arrestment is usually of a local and incomplete kind, and its immediate effect is too often to increase the complexity of the problem we are attempting to solve. At the same time progress has been made, and further progress will yet be made by means of the careful study of these partial arrestments, which we may at once recognize as teratological phenomena or malformations, and so ultimately the abnormal and the normal will prove mutually elucidative.

In what remains of this article it is my purpose to try to educe from the embryological and teratological data at command such general principles and laws as seem to be educible. Let the reader meanwhile bear in mind that some of these principles rest upon very insecure foundations, and that, after all, there is but little advantage in formulating statements which are apparently definite, concise, and clear-cut if the facts do not warrant them or are not sufficiently known to warrant them. Facts must not be twisted to suit preconceived general principles, but general principles must be allowed slowly and surely to emerge from the rigorous investigation and comparison of facts. The principles which follow may be said to be emerging from the crucible of modern exact research; they are not all pure gold, but they have appreciably been cleansed from some impurities.

First. It may be stated with a large degree of confidence that the main progress of events and changes in embryology is from the simple towards the complex and from the general towards the special; there is a trend towards elaboration. From a homogeneity which is at any rate apparent, even if it be not real, there arises a heterogeneity which is both evident and real. From the comparatively simple-looking impregnated ovum comes the superlatively complicated embryo. From the successive divisions of that wonderful unicellular organism come all the tissues and organs of the still more wonderful multicellular organism. To the series of changes

which are thus induced, and in which we see the constant trend towards an increasing complexity, the name *ontogenesis* has been given. It has, it is true, been employed in a somewhat wider sense, but it will be convenient to use it here as indicating the changes in the impregnated ovum by which it becomes a fully formed embryo. As this progressive differentiation is going on, generation after generation of cells comes forward and plays its part, being always represented by a yet more numerous progeny of cells, and so ontogenesis may from this stand-point be regarded as a great genealogical tree. (Delage.)

Second. The heterogeneity which is produced in the process of ontogenesis is of two kinds. In one of these the differences are seen in the cells themselves; they grow unlike each other; there is a histological differentiation. In the other the differences are visible in the arrangement of the cells into organs; they are built together in different ways into organs; there is an organogenetic differentiation. There are different sorts of cells, and they are arranged in different sorts of ways.

Third. The startlingly divergent results found in the organs of the fully formed embryo may probably all be ascribed to differences in the rate of growth of the tissues composing the various organs and parts. In this way the manifold twistings and overlappings, projections and invaginations, separations and approximations, which are seen in all embryos before their parts settle down into their permanent relationships are to be accounted for. A greater rapidity of growth of one part will cause a projection outward or inward at that part; a slowly growing part will find itself surrounded—built in, so to say—by the more active neighboring areas; two organs, at first far from each other, may come into contact if both grow at a quicker rate than the body as a whole; they may even do so if one only grows faster, but then the meeting-place will not be midway between them, but nearer to the more slowly growing one. We speak in a loose fashion of the movement of various parts of the embryo in development, but the idea conveyed is erroneous if by it we mean that one organ, without altering its rate of growth, approaches another or passes away from it. Morphogenesis, then, is largely, if not entirely, the result of differences in the rate of growth of neighboring parts.

Fourth. There is a specificness in the ontogenesis of different

types of animals. The embryos of different animals do not travel by the same route to reach their later stages; there is a wide diversity between their ontogenetic processes, how wide we do not probably fully realize as yet. Even when the fully formed organ or part in two species of embryo seems to be exactly similar, it does not apparently follow that it has reached this stage by the same series of alterations. The embryo of the chick differs from that of the mammal in the details of its development; further, each has an amnion, but there is some reason to believe that it is not formed in the same manner in each. This principle cannot be too clearly kept in mind, for in the past it has been neglected, and it was too confidently believed that what had been proved to occur in the chick embryo might be regarded as proven also for the human embryo. The results have doubtless been fatal to accuracy. If we wish to forecast the probable direction of ontogenetic processes in the human subject, we ought to study the embryonic changes in another mammal at least, and not have recourse to observations in ovarian embryology.

Fifth. As a general rule, the higher an animal is in the zoölogical scale the more complex will be its ontogenesis. At the same time the progress towards complexity need be neither uniform nor constant. The highest of one group of animals may have an ontogenesis much more complex than the lowest of the group next in order above it. There is, in other words, that specificness or individuality in development to which I have already referred. There is no complete chain of types representing a regular sequence of ascents in embryological elaboration.

Sixth. There is a general principle which may be stated in several ways, and which has given rise to an immense amount of discussion. It has also been called "the great law of biogenesis." It may be enunciated in this way—that ontogenesis never follows a simple and direct route, but reaches its end by détours, the "détours of evolution," as Delage [1] calls them. In the forming of the completed embryo there are stages passed through which apparently serve no useful purpose; there are organs which appear and disappear again, leaving sometimes rudiments which confessedly are dangers to the organism. Some of these transitory organs have

[1] Delage, Y. La structure du protoplasme et les théories sur l'hérédite, 1895.

a temporary use, but others seem to have none at all. The higher vertebrate embryo, for instance, has three sets of urinary organs,—the pronephros and its duct, the mesonephros and its duct, and the metanephros and its duct; the necessity for all of them is not apparent. Further, it has for long been noted that some of the "détours," or temporary organs and parts, distinctly recall the stages or appearances seen in animals lower down in the zoölogical scale; and so it came to be thought that in ontogenesis there is a sort of recapitulation of comparative anatomy, or, to put it into more modern terms, that ontogeny gives a condensed phylogeny, or that there is a reminiscent projection of phylogeny into ontogeny. Before, however, we discuss the correctness of this conclusion, let us see that we have a clear idea of what is intended by this general principle, this "great biogenetic law."

Henry Drummond[1] gave a picturesque and vivid description of what he understood by it and read into it. He wrote: "The human embryo . . . is a subtle phantasmagoria, a living theatre in which a weird transformation scene is being enacted, and in which countless strange and uncouth characters take part. Some of these characters are well known to science, some are strangers. As the embryo unfolds, one by one these animal-actors come upon the stage, file past in phantom-like procession, throw off their drapery, and dissolve away into something else. Yet as they vanish, each leaves behind a vital portion of itself, some original and characteristic memorial, something itself has made or won, that perhaps it alone could make or win—a bone, a muscle, a ganglion, or a tooth —to be the inheritance of the race." So Drummond pictured the human embryo "wandering about among the ghosts of departed types." In making a man, "Nature introduced the framework of these earlier types, displaying each crude pattern by itself before incorporating it in the finished work." "Every creature that lives climbs up its own genealogical tree before it reaches its mature condition." Thus Drummond.

This law, which, as we shall presently see, is not so really a law as has been thought, may be stated in another way. Apparently the framework of the body is not laid down once for all, but is rather constructed in portions and even in overlapping portions, so to speak. One part of the framework may be replaced in whole

[1] Drummond, H. The Ascent of Man, p. 87, 1894.

or in part by a new substructure often of a type quite different from that which has preceded it. Readjustment, adaptation, alteration, and variation are processes constantly at work in the life of the embryo; it is by reorganization that order is brought out of the seeming chaos of the results of blastodermic activity. If one were to imagine a builder constructing a hotel by first erecting the scaffolding of a cottage, by then, after building-operations had only just been commenced, replacing this by the scaffolding for a villa, and that again by the framework necessary for a mansion, and then, finally, rearranging and as far as possible utilizing all the materials for the formation of a hotel, one should have an idea, albeit an imperfect one, of the character and complexity of ontogenesis. The comparison is, of course, almost ludicrously inadequate, for it gives no indication of the marvellous manner in which in organogenesis all the materials of the temporary scaffoldings are made use of in the construction of the permanent edifice, are worked into it so exactly as to be indistinguishable from each other in it. Only here and there in the body, in the appendix vermiformis, the fossa ovalis, and the ductus arteriosus, are to be seen the traces of some parts of the earlier formations that have either been incompletely utilized or have been imperfectly replaced by the later productions.

This same general principle of ontogenesis may be set forth in another way, as *evolution by atrophy.* In order that a new scaffolding may be set up it is necessary that the former atrophy; if a new plan of construction is to be followed, it is needful that the old plan be abandoned. To quote from Ernest Mehnert (*Biomechanik erschlossen aus dem Principe der Organogenese,* Jena, 1898), as rendered by J. Arthur Thomson ("Mehnert's Principles of Development," *Natural Science,* xiv. 385, 1899), involution and evolution go hand in hand. The ovum develops, the polar bodies degenerate; the blastoderm develops, the merocytes degenerate; the head grows, the tail dwindles; the higher nerve centers of the mammalian brain increase, the occipital region diminishes; the metanephros comes, the pronephros goes; the backbone strengthens, the notochord disappears; and so on throughout a continual necrobiosis.

In whatever way it may be stated, there can be no doubt that in ontogenesis there is very evidently this principle or plan of reaching the final result by ways that appear to be roundabout,

by scaffoldings that are temporary, and by processes that look like atrophy. When, however, the attempt is made to find a constant and determining rule or law dominating the ontogenetic détours and the developmental scaffoldings difficulties at once emerge; the explanation that the embryo of the higher vertebrates passes rapidly through a series of stages which represent the permanent forms of embryos lower in the zoölogical scale breaks down at once upon close examination, and, as yet, no other satisfactory hypothesis has arisen to take its place. But this fact demands a separate paragraph, and it will be best to embody it in a general principle, the *seventh.*

Seventh. Then, it may be affirmed, that ontogeny does not give a short recapitulation of evolutionary progress; it is not an epitomized phylogeny. This is seen in the fact that the time at which an organ appears in individual development does not always indicate the historical or phylogenetic age of that structure. If there is, then, a recapitulation in ontogenesis, it is one in which Nature makes mistakes, or, to express the matter in more scientific language, there are "time-displacements" in development. For instance, the heart is regarded as a secondary differentiation (due to functional adaptation) of that part of the primary ventral blood-vessel where the greatest resistance has to be overcome; but in the organogenesis of the human subject the heart appears before the associated main vessels. The mammary glands, also, make their appearance in the individual before the sebaceous glands from which they are supposed to have been differentiated; and the paired eyes in vertebrates arise long before the much older pineal eye. It would seem, to revert for a moment to a non-scientific way of speaking, as if Nature, in telling in the individual the story of his descent (or ascent), made occasional slips and put incidents in a wrong order of occurrence. Doubtless the mistakes are only seeming mistakes, and an explanation is hidden away somewhere if only it could be found. Possibly, as Mehnert suggests, when an organ rises in physiological importance and structural differentiation it acquires a proportionate increase in its rate of development. Progressive organs are accelerated in their rate of development, and retrogressive ones tend to be belated; and their state of acceleration or belatedness (or retardation) is due to the intensity of developmental energy in them. It is not yet clear what exactly it is that

exalts or depresses developmental energy. It must apparently be conceded, therefore, that ontogeny is not, in point of the sequence of events, a recapitulation of phylogeny; but it does not necessarily follow that there is no tendency for it to be so. It would seem that there is a constant inclination towards a chronological parallelism between ontogeny and phylogeny, along with frequently occurring interruptions and disturbances due to circumstances possibly of the environmental or hereditary character. It is not true, then, that "every creature climbs up its own genealogical tree," but it would seem to be true that it tries to do so; perhaps it sometimes swings from branch to branch! At the same time, even if the recapitulation principle be accepted in this partial form, it must not be forgotten into how marvellously short a story has been condensed so inconceivably long a history. In the first six weeks of the antenatal life of the human embryo are represented in epitome all the ages that have gone to the making of man! And each life adds on something to the ever-lengthening tale!

Further than these seven principles it does not seem wise in the present state of our knowledge to go. It would be easy to add to the number, but the additions would be hypothetical generalizations, and they would also be hypotheses about which embryologists are far from being in agreement. There is, for instance, the question whether the various parts of the embryo exist already in the ovum and need only to be rearranged during organogenesis, whether each organ, each tissue, and each cell is represented by a distinct and proper rudiment (*anisotropy* of the ovum, so-called); or whether the substance of the ovum is homogeneous and contains no parts specially set aside to form definite structures in the embryo, whether it is *isotropic*. The weight of evidence is apparently in favor of the isotropic character of the ovum; but there are exceptions, and it would seem as if in certain animals it were sometimes, and in others always, anisotropic. The evidence is chiefly of the experimental kind, and is not free from fallacy.

Enough has, however, been said to show that there are general principles in embryology, general laws, the appreciation of which will facilitate the understanding of the constructive phase of antenatal life. The outstanding peculiarity of embryology is still its complexity, for the general principles do not lessen that—they rather throw it into bolder relief; but surely behind this com-

plexity there is a real simplicity if we could find out the great determining factor in embryo-formation. The results of the action of gravity are complex enough, but behind their perplexing manifestations is the simple law of gravitation. There may be some such simple and universally applicable principle of ontogenesis, if it could only be discovered. We need for embryology an Isaac Newton "of an extraordinary genius and proficiency in these things."

With one other reflection I must bring to a close this presentment of general principles. It is in relation to the apparently unfinished state to which the human embryo has been brought by evolution or by whatever process has been active in aiding progress in ontogeny. There are still to be seen in the embryo traces of the phases through which it has passed, remnants of the scaffoldings which have, so to say, not yet been completely taken down or utilized for other purposes. It would almost seem as if the progress of the embryo toward perfection has been arrested at the present stage in the human subject. So long as there are found in the body rudiments of earlier formations which are capable of mischief and apt to become dangers to the economy, so long we may fairly look for progress. Are we wrong in thinking that the world has not yet beheld the final phase in the ascent of man in the production of the embryo perfect in every part and without dangerous structural relics and morbid tendencies? It may never be brought so far, but Hope whispers that it may approach a little nearer than now. In the words of Dante (as rendered by Cary):

> "Though ne'er to true perfection may arrive
> This race accurs'd, yet nearer then than now
> They shall approach it."

Progress of Medicine

DURING THE YEAR 1902[1]

BY EDWARD WILLARD WATSON, M.D.
AND
HENRY W. CATTELL, M.D.
Of Philadelphia

Study and research never cease. While the resulting progress may vary in apparent amount from year to year, a steady advancement of medical science will be found to be taking place in all its various branches. Sometimes the year marks a total change in our ideas and ideals,—the opening of a new door,—the turn of the road to a new and untried region. Such an epoch marked the discovery of the omnipresent bacillus and its recognition as a cause of disease. Since then the trend of our newer thought has been in the pursuit of new bacterial effects in the causation of disease, of new antitoxic sera with which to combat the disease so caused, and of the action of the internal secretions on bacteria and their products. The surgeon benefited first by these discoveries, and, quick to grasp the idea, found himself able to attempt and to succeed in operations hitherto deemed necessarily fatal. Medicine still seeks its antidote, universal or special, in careful laboratory investigation and experiment, though it is just possible that the physiologic chemist may step rudely in and realize the dream of the physician by finding in some germicide, till now unthought of, an agent which will prove itself lethal to all bacteria and yet leave unharmed the organism with its living cells and living blood-current. This

[1] The cuts illustrating the various articles have been kindly supplied by the publisher of the journal from which the article has been abstracted. The writers are also indebted to various abstracts in *American Medicine, Philadelphia Medical Journal, Journal of the American Medical Association, Schmidt's Jahrbuch, British Medical Journal, Lancet*, and other journals for suggestions and material used in the preparation of the article. The references, wherever practicable, have been traced to their original sources.

would simplify matters, for the chemical theory of toxins and antitoxins is rapidly becoming involved with new terminology and new sublunary chemistry, through whose mazes the mind of the ordinary student refuses to follow. That such a discovery is not unlooked for is shown by the avidity with which the press hastened to report the success of Dr. Barrows, of New York, in using injections of formaldehyd directly into a vein for septicemia. The use of a 1 to 5000 solution of formalin, as practised by the doctor,[1] will probably, from its first success, be followed up, but it is as yet too early to decide on the merits of this procedure. Barrows used an aqueous solution of formalin, but suggests in his paper the employment of a normal salt solution, as it in no way interferes with the action of the formalin.

The year that has just passed has been marked by a few noted discoveries and many short steps up the hill, which bring us nearer to our goal; but there has been no such radical departure from the old ways as marked the progress of a decade ago. The books of the last few years are not worthless, although their predecessors died out in a night. Specializing seems to be approaching its limit, and some specialties are proving themselves to be too limited to furnish a successful career. But the death-rate is lessening as the doctors grow more numerous. Comparison of the death-rate of the seventeen principal cities of the United States in 1887 with that in 1902 shows in every one of them a marked improvement. Sometimes, as in Chicago, it is a fall of from 20.21 to 13.88 per 1000, or, as in Detroit, from 18.65 to 13.85 per 1000, but in all it is very considerable. And when we look around and see how in many points our sanitary surroundings might be still more improved, we can readily imagine a day to come when an annual death-rate of over 10 per 1000 would be considered a civic disgrace.

The two great municipal object-lessons of the year have been Cleveland and San Francisco. In Cleveland disinfection with formaldehyd gas to the neglect of vaccination has proved its utter futility. In San Francisco the method of stamping out a plague epidemic by suppressing all mention of it has made it now a dread menace to the whole country.

During 1902 the journals have given much space to the ques-

[1] New York Med. Jour., January 31, 1903, p. 177.

tion of medical legislation and medical reciprocity, the older members of the profession who practised before the new medical State laws were enacted having awakened to the fact that they are practically in serfdom, bound to the soil of their native State if they desire to continue in practice. Many ways out of the dilemma have been suggested and strong efforts are being made to establish a fair system of medical reciprocity, so that a good practitioner at home may have an equally good standing and opportunity to practise wherever in our land circumstances may call him. To do this requires the co-operation of the several State medical boards, and it should not be difficult to bring about such a reciprocal arrangement in regard to men who have already passed the examining board of one State. But a deeper depth of misery has been sounded by those still older luckless practitioners who were already at work before the passage of the present State enactments, and who have been yearly acquiring valuable experience in practice while yearly forgetting the minutiæ which make up the answers to the questions required by examining boards. For them there seems no salvation. They must go before a board of strangers, should they wish to move to another State, and under unfair conditions meet their fate. Any reciprocal legislation should bear their case in mind, or still greater injustice will be done. How much these State laws have done in suppressing quackery can be noted by studying the window signs of the practitioners of the various 'pathies as one goes through our streets.

Bacteriologists have long known of the close relations existing between the members of the typhoid and colon groups of bacilli. Clinicians are now studying with great interest those cases which do not give the Widal reaction, while presenting symptoms similar to those seen in enteric fever. Grünbaum [1] suggests the use of the term typhocoloid fever for such cases instead of paratyphoid or paracolon fever. The blood, urine, and feces in all these cases should be tested for bacilli of the intermediate group. Blood counts, especially of the leukocytes, and the diazo-reaction in the urine should also be determined.

During the year attention has been called to the wide-spread existence of uncinariasis in the United States, with its close rela-

[1] Brit. Med. Jr., September 20, 1902, p. 885.

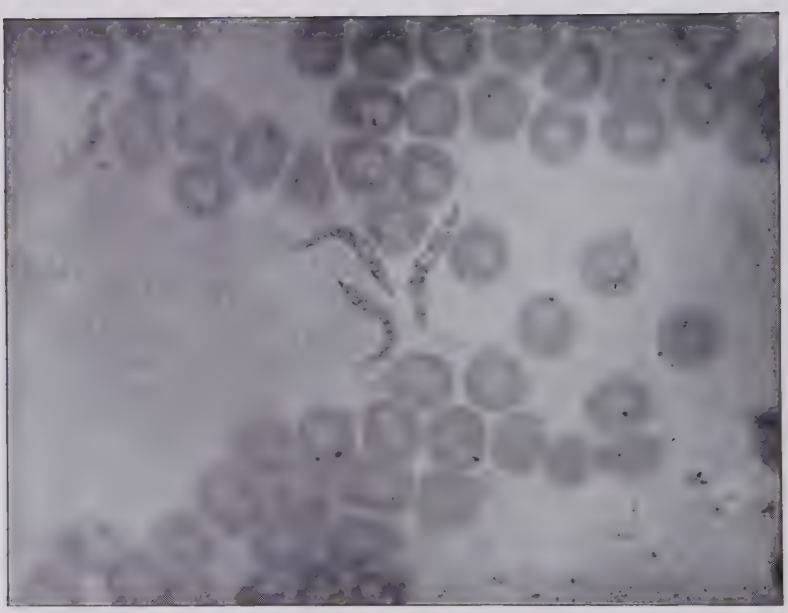

FIG. 1.—Trypanosomes of surra, horse's blood. (From article by Joseph J. Curry in American Medicine, July 19, 1902, p. 96. × 1000.)

tion to filth and squalor. It is said to be frequent in Virginia and the Carolinas, where its symptoms are not so severe as in the more fatal forms of *Uncinaria duodenalis* of Europe. Harris concludes it to be the most common of the serious diseases of the South. An examination of the feces reveals the eggs and renders the diagnosis easy. Uncinariasis was also found in the workers in the Dolcoath mine in Cornwall. It will be recalled that in 1880, during the construction of the St. Gothard tunnel, the laborers there were similarly affected.

Among the various diseases carried from the lower animals to man and recently the subject of investigation, may be mentioned a form of ozena found in dogs and children which has been investigated by workers in the Pasteur Institute. In Ohio it is believed that an epidemic of scarlatina was traced to a flock of pigeons. Cobb, investigating a disease called spotted fever in Montana, found the disease to be due to a tick, which is one of the parasites of the ground squirrel. Josias was able to show that a case of aphthous fever in a 13 months old child was derived from a cow furnishing the milk for the baby's nutriment. Urticaria caused by the *Dermanyssus avium* is described by Heinicke. Inquiry should be made as to whether there is a canary, parrot, or swallow's nest about the house, and the removal of the cause will give a cessation of the affection. Kobert has gathered 99 epidemics of scarlatina, in 70 of which no less than 5312 persons were affected, 195 epidemics of typhoid, and 36 of diphtheria, due to milk.

The flagellated protozoon, *Trypanosoma,* is not a harmless parasite like the *Trichomonas,* but at least 4 animal diseases are due to it: surra (Fig. 1), in India, nagana, in Central Africa, mal de caderas, in Brazil, and dourine in Algeria, South France, Spain, and Turkey. Their recent discovery in man by Nepveu,[1] Dutton,[2] and others makes another tropical disease added to the long list which have lately been investigated by the numerous workers in this field of medical research.

Surra in the Philippines has attacked horses and mules in the United States army, and the possibility of its introduction into this country should be considered. The serum treatment of Laveran

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[1] Brit. Med. Jr., December 6, 1902, p. 1807.

[2] Brit. Med. Jr., September 20, 1902, p. 881. (Literature.)

affords our only means at present for combating it. Foot-and-mouth disease having broken out in cattle in the New England States, severe measures have been taken to stamp it out. The disease often attacks man.

Klemperer and Scheir [1] believe that the bacilli found in ozena and in rhinoscleroma are not the cause of the disease, but nothing more or less than modified forms of the Friedländer's bacillus.

The controversy concerning the possibility of the transference of bovine tuberculosis to man still continues, and a more minute division of the tubercle bacilli according to their degree of virulence is recognized. So great is their variation in this respect that the view of Koch that the inoculation of a given culture into cattle would show whether it was of human or bovine origin becomes of little value until the pathogenic power of the culture used has been proved. Dr. Ravenel has isolated, from the mesenteric glands of milk-fed children who died of tuberculosis, a culture which is as virulent for all animals on which it has been tested as cultures from cattle usually are. Garnault, who submitted to two inoculations on himself with fragments from a tuberculous lesion in the liver of a cow with advanced tuberculosis, had a development of indurated nodules, the pus from which contained tubercle bacilli virulent for guinea-pigs, for several months; being satisfied that he had demonstrated the inoculability of bovine tubercle in man, he allowed the tubercle to be excised and now apparently enjoys good health.

The great therapeutic value of the X-rays in the treatment of epithelioma is now established, although, *per contra,* some cases have been reported of cancer following the severe dermatitis set up by the reaction of the X-rays on the skin. This agent, Finsen light, and baths of oxygen have proved successful in tuberculous and cancerous peritonitis. The discovery of diphtheria bacilli in noma pudendi and cancrum oris has led to the successful use of antitoxin in these conditions, and its use in erysipelas and pneumonia has also adherents.

Investigations as to the cause of death on the island of Martinique during the recent volcanic catastrophe lead to the conclusion that when death came suddenly carbon monoxid was the principal lethal agent. Recent observers also consider this sub-

[1] Ztschr. f. klin. Med., xlv, 1902, p. 133.

stance to be a not infrequent cause of anemia and death in our cities, being derived from illuminating gas.

In neurology the psychology of autoaccusation,[1] the lachrymal reflex,[2] the prefontal lobe as the seat of the mental faculties,[3] triple personality,[4] and many other subjects have been discussed. Von Bechterew[5] has called attention to cases of spasmodic laughter in organic disease of the brain and in epilepsy. In the case reported by him spasms of violent laughter, without loss of consciousness, occurred, following the sensation of tickling in the left arm. The lesion was supposed to be an organic affection of the basal part of the right hemisphere on account of a left-sided hemianopsia and hemianoptic pupillary reaction. Fréré[6] points out that an epileptic attack may be brought on by a sudden normal or physiologic stimulus of a sensory nerve. The writer cites a case in which sudden stimuli of light, sound, touch, and even smell could bring on a convulsion. Thomas[7] gives an instance of an epileptic becoming aphasic in his attacks but whose consciousness remained clear. William Wood's mixture of antipyrin and ammonium bromide is recommended by Thomson in the treatment of epilepsies, but strychnin should not be administered as a tonic, since it increases nervous excitability.

Symphysiotomy is now rarely performed owing to the ease with which Cesarean section is done. The latter operation has, however, not given as good results as was hoped for in placenta previa, except where the placental attachment is directly over the inner os. Koch of Bonn has devised an operative procedure for the prevention of conception in medical cases requiring this procedure. Two valve-like folds of mucous membrane are made at the anterior and posterior lips of the os uteri, so arranged as to prevent the entrance of the spermatazoa, but still permitting the exit of the menstrual flow. By the removal of these folds later on, fertility is alleged to be restored. Freeborn[8] finds from 10 years' experience that males are

[1] Lancet, November 8, 1902, p. 1270.
[2] Phila. Med. Jr., May 17, 1902, p. 892.
[3] Amer. Med., May 17, 1902, p. 83.
[4] Med. Rec., August 9 and 30, 1902, pp. 207 and 355.
[5] Deutsche med. Wchnschr., April 17, 1902, p. 283.
[6] Journal de Neurologie, November 5, 1902, p. 429.
[7] N. Y. Med. Jr., November 8 and 15, 1902, pp. 793 and 840.
[8] Can. Pract. and Rev., August, 1902, p. 431.

produced in those who limit their sexual connection to a period of 10 days before the next expected menstruation. He claims 98 per cent. of successes in some 500 cases when correct data were furnished.

By means of curves expressed in the form of a chart, Matsuura [1] has studied the thickness of the hair in 30 healthy and 70 diseased persons. By such means can be determined, (1) whether the disease was or was not attended with disturbance of nutrition; (2) approximately the duration of the disease, and (3) the course or the form of the disease. These studies are alleged to be of especial forensic importance on dead bodies.

In the fourth Huxley lecture, William H. Welch [2] goes over the recent studies of immunity with special reference to their bearing on pathology. One of the most important results of recent work, the separation of the specific antibodies into two groups, in one of which, represented by the antitoxins, the antagonists are single bodies; while in the other, represented by the cytolysins, the antagonistic effect requires the coöperation of two bodies, as is seen in snake venom, where the really destructive portion is widely distributed in the blood and cells of man and animals. Welch accepts the new specific blood test mentioned in last year's Progress of Medicine, and thinks that in all probability Duval and Bassett have found in the bacillus of Shiga the specific agent of infection in the summer diarrhea of infants. Flexner has still more recently announced a specific serum for the treatment of this fatal summer affection.

The visit of Dr. Lorenz and his appearance in various cities of the United States formed a striking episode in the year. What effect his public operations will have upon the practice of American surgeons remains to be seen. Lorenz might be described as a surgeon who in the most skilful and perfect manner carried out successfully an obsolete procedure. The mind refuses to believe that for universal use his method can be equal to the more scientific, methodical, and certain operation practised by others. It will have to be remembered, too, by his imitators that all men have not his experience, skill, and strength. Those interested in the pathol-

[1] Arch. f. Dermatol. u. Syph., vol. lxvii, 2 and 3, 1902, p. 273.

[2] Lancet, October 11, 1902, p. 977, and in many other medical and scientific journals.

ogy of congenital dislocation of the hip will find an excellent illustrated article on this subject by Karl Ludloff, in vol. x, No. 1, of the *Klinisches Jahrbuch,* 1902.

Have we educated the public too much? is a serious question praying for an answer. Already it is becoming difficult to prescribe drugs, because the patient knows all about them and has preconceived ideas as to whether or not they agree with his constitution. In matters hygienic, in the boiling of water and the sterilizing of milk, and in regard to the manifold dangers that lurk in uncooked vegetables and foul drain-pipes, he is by no means a bad scholar; but in fear of contagion he is at the head of the class; even the churches teach it. We take up a leaflet published and circulated by a great religious body, and we read, under "Helps to the Young," "We catch other things besides consumption from our relatives and friends," showing that consumption and its contagion have, thanks to our unregulated and ill-advised efforts, become the great bugbear of the age. Even little children are taught to shun sick relatives, and in one of our States a bill has just been introduced which forbids kissing under penalty of severe punishment! Yet all the while statistics are showing us that, while we have in civilized communities reduced the death-rate of consumption 25 per cent., the death-rate of pneumonia is rising with fearful rapidity, and in the background cancer, which has some correlation with tuberculosis, increases by leaps and bounds. Is it possible that there are certain underlying laws of mortality, of births and deaths, which we have not discovered, but which we can never circumvent? And that we invent diseases to make up for those we displace, and vices also to take the place of vices we outgrow?

Hysen finds that the consumption of cocain and morphin is increasing too rapidly for their legitimate use in medicine, the use of cocain having increased 400 per cent. since 1898, and opium and morphin 600 per cent.; 712,000 pounds of opium alone, besides over a ton of morphin, were imported during 1902. These statistics may, however, be somewhat misleading. We should like to know the increase for the different States separately, as the use of these drugs increases most in States and counties where there is restrictive liquor legislation. And do the opium drunkard, the morphin *habitué,* and the cocain fiend merely take the place of the converted and reformed alcoholic inebriate? Have we again, as in

our war on consumption, possibly merely turned the ever-flowing stream of the weak and non-resistant into another and deeper channel?

The use of nitrous oxid preparatory to the giving of ether is increasing in favor among the profession, and the employment of inhalations of oxygen in ether and chloroform narcosis, in pneumonia, and in other diseases has led to larger demands for this therapeutic agent. One of the novelties of the year is the preparation of oxygen of over seventy per cent. strength from liquid air, the nitrogen being allowed first to evaporate.

Cocainization of the spinal cord is not held in as much favor as at first, owing not only to the number of deaths reported at or shortly following its employment, but more particularly to certain low-grade inflammatory changes which are found to occur in the cord following the injections. It will, however, always have a limited use, as its employment gives a surgeon the opportunity of performing operations unaided, though narcosis can be equally well accomplished by the combined hypodermic use of morphin and scopolamin. In order to avoid shock in major amputations, Cushing [1] injects cocain into the large nerve trunks preliminary to their division. Anesthesia by compression of the carotid arteries has been of late again brought to the notice of the profession. Steiner, a physician in charge of the hospital in Java, observed a native healer employing this method, and found in a series of experiments that most subjects responded, and that the loss of sensibility could be so great that an operation could be performed without pain.

The death of Virchow on September 5, 1902, in his eighty-first year meant the passing away of the last connecting link between the old and the new *régime* of pathology. Among the numerous articles which appeared about him in the medical journals, those in the *Philadelphia Medical Journal* of September 13, 1902, well display his manifold character as a teacher, statesman, and scientific worker in the most varied fields of medicine (Fig. 2).

One of the most important contributions to the discussion of heredity is the rediscovery of Mendel's law [2] published in 1865. According to him, hybridization is not fundamentally a mere game

[1] Annals of Surg., September, 1902, p. 321.
[2] Independent, January 22, 1903, p. 179.

Fig. 2.—Rudolf Virchow.

of chance, but follows a law of regularity of averages. He found from a careful study of the garden pea in successive crops that the characters remain pure and do not blend and that their reappearance follows in numerical order. Thus, two-thirds of the dominants (D) break up the following year into one-fourth constant dominants, one-fourth recessives (R), and one-half that again break up. The one-half that breaks up are the true hybrids. Differentiating characters in plants reappear in their purity and in mechanical regularity in the second and succeeding hybrid offspring of these plants. This mechanical law, in other words, is that each character separates in each of these generations in one-fourth of the progeny and thereafter remains true. In concise figures it is expressed as follows:

1 D : 2 DR : 1 R.

1 D and 1 R come true, but DR breaks up again into dominants and recessives in the ratio of three to one. Where many characteristics are to be contrasted, the working of the law is not so simple, nor does it hold good for all plants.

The perilous illness of King Edward VII and his submission to an operation for appendicitis aroused during the year more than a passing interest throughout the world. It has at last taught the general public that in matters surgical a king is no longer a king and that the surgeon can for a time exercise over him a more powerful sovereignty. Last year we had to note an unsuccessful operation on the head of this republic, but the lesson in King Edward's case is most striking and forcible because of his recovery. The one perhaps dampened the ardor of the surgeon, but the other has elated him.

Surgery was practised before the historic age, but conditions were somewhat different from those existing to-day. M. de Morgan[1] has given us recently a reproduction of the stele of King Hammurabbi, which Hugo Winckler has translated, and it proves to be the oldest document relating to early institutions and civil codes now existing, dating back nearly a thousand years before the earliest date assigned to Mosaic legislation, and in it the physician appears under peculiar conditions. "If a surgeon makes an operation on any one with a knife and heals him, or opens a tumor

[1] Independent, January 8, 15, and 22, 1903.

(referring to the eye probably), and the eye is uninjured, he shall receive ten shekels." But, as if to balance this enormous fee-bill of ancient Babylonian physicians, "if he makes an operation and kills his patient, or opens a tumor with a knife and the eye is destroyed, then his hands shall be cut off." The other fees named in this ancient document were five shekels for setting broken bones in a citizen, three for a freedman, and two for a slave; for operating on an ox or an ass, one-sixth of a shekel, while if the animal died the unfortunate operator had to pay the owner one-fourth of a shekel. In another region of this old earth—in Knossos—Arthur J. Evans has discovered a civilization which was old before the days of Homer and the years of Troy. The palace exhumed by him shows an advanced state even then of sanitary science which excites our wonder, with its ornamented bath-rooms and elaborate system of underdrainage. The Old World will, however, have to yield the palm to us in prehistoric antiquity. Leavenworth, Kansas, claims to have discovered the oldest human skeleton in existence, dating back certainly to the glacial period, if not earlier. The place of its discovery was seventy-three feet in the side of a hill and twenty-three feet below the surface, which was strewn with glacial bowlders above it.

MEDICINE

CANCER

THE problem of the increase of cancer in recent times is exciting continued interest. That it has increased is hardly disputed. R. de Bovis[1] gives a valuable review of recent statistics and shows, in the following table, the number of deaths from cancer per 100,000 inhabitants in different countries, in 1880, 1888, and 1900:

	1880.	1888.	1900.
England:			
Kingdom	51.1	62.1	82.9
London	58.7	69.6	94.0
Austria (Cisleithan)	37.6	49.1	73.9
Bavaria	56.2	...	98.5
Scotland:			
Kingdom	49.1	61.0	77.0
Eight principal cities	46.5	62.8	88.0
Spain (Madrid)	...	...	89.3
France:			
Paris	98.2	107.1	121.0
Cities of over 5000 inhabitants	...	...	99.0
Holland	50.1	69.0	95.9
Ireland	34.3	43.0	58.0
Italy	21.1	42.7	51.9
Norway	43.0	54.0	85.0
Prussia	26.1	40.9	57.3
Russia (St. Petersburg)	...	116.1	88.6
Sweden	80.1	...	100.2
Switzerland	...	114.4	132.4
United States:			
Baltimore	...	45.1	60.8
Buffalo	32.0	...	52.0
Washington	60.0	69.4	70.3
Seven largest cities in America	35.4	...	66.4
State of Massachusetts	52.0	60.0	60.6
All States taken together	...	29.0	...
Argentina:			
Province of Tucuman	...	...	10.6
City of Buenos Ayres	...	...	90.0

"To complete the picture the following figures are quoted from Behla:[2] In Queensland the death-rate from cancer was 26 for 1891,

[1] Semaine méd., September 10, 1903, p. 297.

[2] Centralbl. f. Bakteriol., November 25, 1899, p. 593.

36.7 for 1895. In New Zealand it was 26.9 for 1881, 47.5 for 1890, and 55.3 for 1895. Cancer is 'very rare' in Central and Western Africa, 'rare' in Constantinople, in Egypt, and in India, 'a little less rare' in China, 'rather common' in Japan, 'unknown' in Greenland, the Färoe Islands, etc. In order to show the advance of cancer during greater intervals he refers to the statistics which show but 17.7 deaths for the year 1840 for every 100,000 inhabitants of England, and but 19 in 1865 for Norway as against 85 in 1897. Ekblom presents the cancer death-rate for the small Swedish town of Fellingsbro for 100 years during which it passed from 2.1 to 118 per 100,000 inhabitants, the figures representing the average for the first and last decade of the century."

In Italy, Ruata [1] gives statistics for 13 years, 1887-1899, showing that while other diseases tend to diminish cancer is increasing. During the 13 years, the average increase of cancer deaths was 1681, the total in 1887 being 12,631; in 1899, 16,680. Of these 4613 were cancers of the stomach and esophagus, then came in order the uterus, the liver, the spleen, the pancreas, and the intestine. Of the 16,680 cases, 6980 were males, and 9700 females. Up to 60 years the mortality is greater in females, after that time there is very little difference in the sexes. Density of population seemed to have no influence in increasing cancer frequency. These statistics with the observation as to climatic conditions support the conclusions of de Bovis.

Wutzdorff [2] gives more figures since 1879. The increase of cases in the German Empire has been 266 per cent., while in 1892 and 1898 the number of deaths per 100,000 has risen from 59.6 to 70.6—increasing far more rapidly than the population. In some of the provinces there was a very marked increase compared with others.

The Royal College of Physicians of London and the Royal College of Surgeons of England have drawn up a conjoint scheme for the systematic investigation of cancer. An endeavor will be made to raise a fund to defray laboratory and other expenses. The plan is very comprehensive and has been thoroughly thought out.

Nösske [3] has been investigating the work of Plimmer, Gaylord, and others, as to their so-called cancer parasites. The Plimmer bodies were seen especially in glandular cancers. They were also found in the glandular proliferations of benign tumors and in inflammatory processes. The bodies described by von Leyden and Feinberg are certainly

[1] Brit. Med. Jr., August 2, 1902, p. 345.
[2] Deutsche med. Wchnschr., March 6, 1902, p. 161.
[3] Deutsche Zeitschr. f. Chir., vol. lxiv, July, 1902, p. 352.

identical with the Plimmer bodies. No one has proved them to be parasites.

Max Schüller, who claims to have discovered the parasite of cancer and sarcoma in human beings, gives an analysis of his recent book on this subject in *La médecine moderne,* February 12, 1902, p. 59. The article also includes his latest observations upon his parasite.

In the second annual report [1] of the Cancer Committee of the Surgical Department of the Harvard Medical School, from work done under their direction by Tyzzer, White, Robey, Richardson, Weis, Greenough, and Nichols, claims made by the adherents of the theory of the parasitic origin of cancer are summed up as follows:

(1) A proliferation of epithelial cells analogous to the lesions seen in cancerous tumors can be produced by certain well-known protozoa (nodules caused by the *Coccidium oviforme*); (2) Certain skin lesions characterized by epithelial cell proliferation are due to the action of a so-called protozoon (*Molluscum contagiosum*); (3) Blastomycetes are constantly present in human cancers and are the cause of the lesion; (4) By experimental inoculations of animals with "blastomycetes," true epithelial or cancerous nodules can be produced; (5) Finally, the well-known endocellular bodies seen in the protoplasm of cancer cells have a definite morphology, are "parasites," and the cause of cancer.

Each of these questions has been studied with the results that: (1) The lesion produced by the *Coccidium oviforme* is essentially a process of chronic inflammation and is not analogous to the lesion seen in cancer. (2) The lesion seen in molluscum contagiosum is characterized by certain changes in the epidermis, is not due to the action of a protozoon, and is not analogous to cancer. (3) The so-called "blastomycetes" ("saccharomycetes") of Sanfelice and Plimmer are torulæ. (4) The lesions produced by these "blastomycetes" (torulæ) are essentially nodules of peculiar granulation tissue, are not cancerous, nor in any sense true "tumors." (5) Blastomycetes are not constantly present in human cancers. (6) The peculiar bodies seen in the protoplasm of cancer cells are not parasites, nor the cause of the lesions, but probably are in part at least atypical stages of the process of secretion by glandular epithelium.

Rosenbaum [2] has investigated the question of angioma of the skin and their possible relation to cancer. He examined 400 cases. He found them invariably after 60 years of age, but believes them to have

[1] Jr. of Med. Research, April, 1902.

[2] Münch. med. Wchnschr., April 22, 1902, p. 658.

no diagnostic significance. Leser [1] has also studied angiomas, and while his own observations leave the question uncertain, he believes that the subject deserves still further investigation.

Radestock reports two cases of cancer *à deux,* and gives some statistics to show the extremely large number of cases of carcinoma in iron-workers in the city of Chemnitz as compared with those in other occupations. Jonathan Hutchinson has recently advanced the idea that arsenic is a cause of cancer and points to its greatly increased use as a medicine. Braithwaite [2] suggests that excess of salt is one, and the essential, of four factors that originate cancer, the three other factors being an over-nourished condition of the body, an impure condition of the body the result of non-use and non-oxidation of the food consumed, and a local irritant. Wakefield [3] suggests that cancer (and allied states) are due to disturbances of catabolism—subcatabolism or catabolic stasis.

Kugel [4] reports a case of breast cancer cured by cancroin. The growth had entirely disappeared in 14 months. Adamkiewicz [5] reports five other cases cured by cancroin. Cancroin is a toxin isolated from cancer juice by Adamkiewicz. He reports [6] four cases of cancer of the esophagus as cured by this means.

Howitz [7] reports favorably on the method of freezing the cancerous vegetations by a jet of ethyl chlorid. This may be followed by curettement and cauterization by the hot iron.

The Röntgen rays have been extensively used in the treatment of cancer during the year with, on the whole, considerable reported success. Coley [8] presents the following conclusions: (1) That the ray has a remarkable inhibitory action upon the growth of all forms of malignant disease, especially sarcoma. (2) That even in far-advanced inoperable tumors they may totally disappear. (3) Whether they will reappear is a question for time to determine. And (4) that there is still reason to hope that deep-seated abdominal tumors may often in this way be reached and cured or benefited. Pain is nearly always relieved by the ray.

Two among the many questions connected with cancer are con-

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[1] München. med. Wchnschr., December 17, 1901, p. 2035.
[2] Lancet, 1901, vol. ii, p. 1578.
[3] Amer. Med., 1902, vol. iv, pp. 809, 851.
[4] Berl. med. Wchnschr., June 16, 1902, p. 567.
[5] Ibid., June 16, 1902, p. 569.
[6] Presse méd., January 22, 1902, p. 77.
[7] Jr. d. pract., vol. xvi, No. 10, 1902, p. 156.
[8] Amer. Med., August 16, 1902, p. 251.

stantly asked. Is it contagious? Does it prevail especially in certain locations? As to its hereditary transmission, the profession is to-day less sure of it than it was 20 years ago. As to its contagion, it is surely contagious to the patient. Instances of cancer spreading in the individual to contiguous surfaces are abundant. In animals it has been transplanted and has grown, and many cases may be cited where we are forced to conclude that the disease has been communicated from individual to individual. The question, however, of its being a contagion lurking in special places, as houses, villages, farms, etc., has of late attracted more and more attention, so that even the term "cancer houses" has been invented, to designate houses in which a number of cases have occurred through a series of years, out of all proportion to the number in similar neighboring houses. This is a question of the greatest practical interest. Dr. Alexander Scott cites a case in which three men, all unrelated, succeeded one another as night watchmen. Each occupied the bedroom of his predecessor, and all died of cancer within four years. In another case three successive tenants of a house died of malignant disease of the rectum. Cases of this kind are numerous, and inasmuch as the question is obscure, suggestive cases should be still further collected and studied in the hope that they may shed some unexpected light upon the long-sought cause of cancer.

DIPHTHERIA

Diphtheria Bacilli in Well Persons.—Schanz[1] refers to the new theory of Behring according to which the diphtheria bacillus is ubiquitous and may at all times be found in the mucous membranes of every one, but only those sicken who have not the necessary quantity of antitoxin in their blood. According to Wasserman and others most persons are thus protected. The author mentions that Neisser and Kahnert have found large quantities of antitoxin in the blood of those who have never had true diphtheria, but who have been under the influence of atypical diphtheritic disease in which both toxic and non-toxic Löffler bacilli were present on the mucous surfaces, as in chronic atrophic pharyngitis. Schanz has strongly defended, since 1894, the theory of the identity of the *Bacillus xerosis,* the pseudo-diphtheria bacillus of Löffler and Hoffman, a saphrophite always present in the conjunctival sac, and the genuine diphtheria bacillus. This question of the identity of these bacilli and of the position of the pseudo-diphtheria bacilli is a matter of vital interest in sanitary science. If the pseudo-

[1] Amer. Med., March 8, 1902, p. 403, abstracted from München. med. Wchnschr., January 14, 1902, p. 64.

diphtheria bacillus is only an attenuation of the true diphtheria bacillus, there is reason to suppose that it may, under certain circumstances, become virulent and be the cause of diphtheria; and should the person harboring these bacilli be considered equally dangerous? This brings up the important question of diphtheria bacilli in well persons. Two years ago the Massachusetts Association of the Boards of Health appointed a special committee to consider the question of the presence of diphtheria bacilli in well persons. Health officers of the principal cities were communicated with, 33 experts entering into the work of observation. The committee has published its report as follows: As to the frequency of diphtheria bacilli in well persons, allowing for some differences as to the characteristics of true bacilli, the replies from the different cities showed a wide diversity, varying from 1 per cent., in Boston, to as high as 22 per cent., in the District of Columbia. Most of the observations were made upon persons who had not, so far as known, been recently exposed to diphtheria. In those who had been so exposed, according to the observation of Chapin, Denny, Kober, and Park, probably from 8 to 50 per cent. of persons in well families are affected with diphtheria bacilli. In institutions established for children the infection appears to be almost general. The danger of infection from healthy persons depends on age, habits, and surroundings. Children are much more liable to convey the disease than adults; cleanly persons less than uncleanly. In crowded dwellings and large institutions it is more likely to spread; occupations are important—as milkmen and nurses. The committee concludes that it is impracticable to isolate well persons recently exposed. They are too numerous. It is not advisable to isolate well persons in infected families, but to keep children in such families from schools. Wage earners may be allowed to continue their work. But teachers, nurses, and others in close contact with children should not be allowed to continue their work.

When diphtheria appears in a community hitherto free from it, it is advisable to isolate at first all persons who have been brought in contact with the patient, until they are shown to be free. As to isolation of well persons infected with diphtheria bacilli, the committee recommended that an attempt should be made to educate the public to avoid the danger of infecting themselves or others. The virulence of the bacilli found in well persons was tested in 86 cultures. It seems reasonable to suppose that in Massachusetts from 1 to 2 per cent. of all persons carry about with them atypical bacili, but not all of these are capable of transmitting the disease; for it is found that bacilli morphologically identical with diphtheria bacilli may have no power of producing toxins. Further than this, examinations made to

test the virulence of atypical bacilli found in healthy persons showed that only about 17 per cent. of the existing 1 to 2 per cent. had virulent bacilli, so that about 17 persons in every 5000 to 10,000 have diphtheria bacilli that are dangerous to the public.

Diphtheria Antitoxin.—Given an absence of antitoxin in the treatment of diphtheria, and we would find but few substitutes employed. The treatment recommended by Löffler and the internal use of a 2 per cent. tincture of myrrh in a 4 per cent. glycerin solution have their advocates, but antitoxin seems the great mainstay; more than that, it is now the mainstay of general serum therapeutics which seem generally unsatisfactory. Eminent authority can be quoted as saying that antitetanic and antidiphtheria sera are the only ones which have proved themselves therapeutically of value; and we might go further and doubt whether the former has had any brilliant record to show outside of laboratory experiments. Even diphtheria antitoxin by no means exhibits the same striking virtues in the human being that it does in animal experimentation. Its field is the antagonizing of pure cultures of Klebs-Löffler bacilli, and the cases presented clinically, owe, at least in part, their virulence to other bacteria. There is also considerable looseness in the diagnosis before administering it. In some cities it is given at once to every suspicious case, and we fear all recoveries are credited to it. Many physicians do not report their mild cases of diphtheria to the Board of Health, fearing the adoption of too severe quarantine and the consequent loss of prestige among their patients. A consequent danger arises from the delay in the administration of the diphtheria antitoxin.

Cairns [1] advocates, especially in malignant cases and in cases seen late, the intravenous administration of antitoxin in large doses, 25,000 to 35,000 units, injecting it immediately into the median basilic vein or even the jugular. The largest amount used was 82,000 units in 3 separate doses. Surely, there must be something wrong in the glowing statistics of the past few years, where almost universal success followed such moderate doses as 1000 to 2000 units.

De Maurans [2] questions the actual specific value of diphtheria antitoxin. He alludes to the fact that antitoxin has been in general use for about 7 years and he has studied the mortality of a number of European cities from 1883 to 1901. His tables well illustrate the death-rate from diphtheria in 14 years, and if antitoxin is a specific treatment, these tables should show a diminution of deaths for the past

[1] Lancet, December 20, 1902, p. 1685.
[2] Semaine méd., December 11, 1901, p. 401.

7 years. This is found in some cities to be the case, while in others the death-rate has been higher than in the years immediately preceding the introduction of antitoxin. Either the antitoxin has not been in all cases good, or it is not a true specific, or the disease, like many others, develops in a cycle, the mortality in different places differing at different times, *i.e.*, becoming higher at certain times, irrespective of the treatment employed.

A very successful series of cases are reported by Thierry and Bertail,[1] where in 79 cases of diphtheria, all the patients receiving from 10 c.c. to 20 c.c. of antitoxin when first seen, and in many cases this being repeated in a day or two, but 2 cases died, 1 of these being the first patient of the series, while paralysis occurred in but 4 cases.

Champion and Vaughan [2] report 43 cases of diphtheria in which tracheotomy was performed in 39, with a total mortality of 10, of which 5 were between 1 and 2 years; 2, between 3 and 4. The mortality between the ages of 2 and 4 was 41.2 per cent., and only 14 per cent. between the ages of 10 and 14. Paralysis occurred in 3 patients. A rash occurred in 14 cases. In 30 cases there was albuminuria. The fatal cases were afflicted with hemorrhage, broncho-pneumonia, suppression of urine, and cardiac failure. From 6000 to 8000 antitoxin units were given as an initial dose and repeated when necessary.

Alsberg and Heimann [3] have collected statistics of laryngeal stenosis, intubation, and tracheotomy. Since the use of antitoxin, the frequency of stenosis of the larynx has decreased to from one-half to one-fifth of all cases. Primary tracheotomy is performed in from one-half to one-third of all cases; secondary tracheotomy has decreased from one-tenth to one-fiftieth, and intubation has risen from one-thirtieth to one-tenth. The total mortality has diminished one-half. In infancy, intubation is not advised on account of the small size of the parts and the narrow pharynx.

Ganghofner [4] reports his result with intubation and tracheotomy in Prague. During the past 5 years the mortality in children under 3 was very high, 30 per cent., in 1900, the lowest year. The mortality in all children was 26.33 per cent. Primary tracheotomy was rarely necessary; secondary, on the other hand, is done often immediately after intubation, becoming practically a primary operation. Intubation is done less than formerly in Prague, but Ganghofner prefers intubation to tracheotomy.

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[1] Bull. méd., March 19, 1902, p. 265.
[2] Lancet, July 26, 1902, p. 212.
[3] Arch. f. Kinderh., vol. xxxiii, 1902, p. 98.
[4] Jahrb. f. Kinderh., May, 1902, p. 521.

Formaldehyd Gas in Diphtheria.—A. N. Blodgett [1] advocates the use of formaldehyd gas in diphtheria. He takes a 2 per cent. solution of formaldehyd with which he saturates towels and sheets that are hung about the sick room.

TYPHOID FEVER

Crombie [2] publishes some statistics showing that the period of greatest susceptibility to typhoid fever both in the inoculated and the uninoculated is from 20 to 25 years of age, and that it is just at this period that the protective power of inoculation has shown itself of value in South Africa. The figures cited in one of the tables show a distinct advantage in favor of a single inoculation, but they indicate a strong susceptibility to enteric fever among those inoculated twice. Up to 30 years the effect of a single inoculation is distinct, 27 per cent. against 50 per cent. among those not inoculated. Beyond 30 years the advantage is on the side of the uninoculated, 14.3 against 27.4 per cent., which would suggest that after 30 years inoculation actually increased susceptibility to typhoid infection.

Toeplitz [3] states that in typhoid fever the nose and the nasopharynx are in a state of dry catarrh. The mucous membrane is reddened, loosened, and swollen, especially over the turbinated bones. This and the deposit generally occurring predispose to mouth breathing. The disturbances caused by the bacillus of Eberth together with the turgid capillaries give rise to the bleeding. Ulceration and even perforation of the turbinated bones may take place, and on healing adhesions may be formed between the turbinated bones themselves.

Veeder [4] gives a description of the causes other than the water supply of typhoid fever. As the bacillus survives in garden earth, as well as in water, great care should be taken of the feces from typhoid fever patients and in no case should they be buried in the garden, as the bacillus multiplies in the soil after its deposit there and may thus easily infect growing vegetables, water, etc., later on. Picnic grounds should be looked after, and flies kept away from those suffering with the disease and from the excreta.

In the French Chamber of Deputies damaging statements have recently been made as to the relative frequency of typhoid in the French and German armies, saying that while the French army in 1900 showed

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[1] Medical Council, February 9, 1902, p. 45.
[2] Lancet, August 16, 1902, p. 426.
[3] Med. Rec., September 20, 1902, p. 451.
[4] Med. Rec., July 26, 1902, p. 121.

a typhoid fatality of 600, the German army had only 87. This is attributed to the fact that the local municipalities in France generally have bad water.

Shell-fish as a cause of typhoid have been investigated in England, France, and America. Nash,[1] reporting an epidemic at South End, England, maintains that there should be special legislation and supervision to prevent the laying down of edible shell-fish in sewage-polluted waters. Examination of some suspected cockles disclosed colon bacilli as well as typhoid bacilli. Nash also states that typhoid is three times as prevalent in the district bordering the Thames as in the rest of the county of Essex, and especially prevalent at river mouths, and that he believes that the withdrawal of the infected shell-fish would reduce the number of cases one-half.

Horsley, of El Paso, Texas, reports cases of disease of the ribs following typhoid fever. This sequel he states occurs only in adults. Fifty-five cases of this condition have been collected by him.

Typhoid spine is an occasional sequel of typhoid fever. Twenty-nine cases have been reported. Moorehouse [2] relates a case in which the pain was localized in the lower lumbar and sacral regions, and the buttocks on one side or other, never in both simultaneously. The temperature varied from normal to 103° F., and there was some emaciation but no deformity or tenderness. During the attack, the spleen, previously normal, was enlarged and soreness persisted long after general recovery on exertion or continued movement.

Ovarian cyst infection is extremely rare as a sequel of typhoid fever. Two cases are reported by Morris J. Lewis and Robert G. Le Conte.[3] Only six other cases are on record.

J. S. Dauriac [4] advises enterostomy in the treatment of typhoid fever. Believing, theoretically, that enterostomy performed with the end of the jejunum would remove one cause of danger, namely, the ulceration, he performed this operation in one case with success.

Gibbes [5] has photographed the eruption of typhoid fever before there were any physical signs of the same.

Paratyphoid Fever.—This condition has recently attracted considerable attention, being one more disease differentiated from typhoid fever, as, long ago, typhus was similarly isolated. Brill [6] considers it

[1] Lancet, November 15, 1902, p. 1338.
[2] Boston Med. and Surg. Jr., July 17, 1902, p. 59.
[3] Am. Jr. of Med. Sc., October, 1902, p. 590.
[4] Presse méd., July 23, 1902, p. 700.
[5] Brit. Med. Jr., March 22, 1902, p. 704.
[6] Med. Rec., November 29, 1902, p. 841.

comparatively frequent, 38 cases having been reported during the year. The symptoms resemble closely those of true typhoid, the only reliable means of diagnosis being the agglutination and culture tests. There has long been more than a suspicion that one or more distinct conditions were confused under the name of "typhoid." These aberrant forms have been called "catarrhal," "continued," or typhoid under silent protest. Catarrhal fever, however, does exist as a distinct fever quite different in some marked particulars from typhoid and probably associated with the cause of influenza and its bacillus in some way; probably a general simultaneous infection of the entire organism by the influenzal process and not as in epidemic influenza, where one organ bears the greater stress of the attack.

Sion and Nagel [1] report a house epidemic resembling typhoid and due to drinking water, when on investigation a colon bacillus of peculiar characteristics was isolated. Six cases were reported, one being fatal, the latter having a left-sided brain embolism and bronchopneumonia, while the intestines were entirely free from typhoid lesions. The blood in three cases gave a positive Widal reaction, but blood cultures from the five showed a short mobile bacillus not staining with Gram's method and quite distinct from Eberth's bacillus. This new-found organism was also obtained from the suspected drinking water.

Longcope [2] reports two cases of paracolon infection, one fatal, neither giving the Widal reaction, and the one recovering was subsequently readmitted to the hospital with a true typhoid attack, with distinct Widal reaction, but with a persistence of the same bacillus in the blood that was found during the previous attacks. Both of these cases had herpes of the lips and epistaxis.

PLAGUE

During the year the plague has continued its ravages in India and China. In the Philippines and in South Africa it has obtained many more footholds than it had a year ago, but in Europe its appearance has been sporadic and in most instances it has been at least suppressed. In South America it still causes deaths in Montevideo and perhaps to a greater extent than is reported still exists in the coast regions. In Mexico there has recently been a serious outbreak which is still on the increase, and there is now no room for doubt that it has existed to a limited extent in San Francisco and its surroundings for

[1] Spitalul., vol. xxiii, No. 14,315, 1902, p. 509.
[2] Am. Jr. of Med. Sc., August, 1902, p. 209.

over two years. At a recent congress of authorities held in Washington more decided measures were determined on. And it is to be hoped that with a new Governor and Administration something radical will be done at once.

Recent studies by Kolle and Martini [1] verify the statement of Batzaroff that the most virulent sera of plague are obtained from the lungs of rats suffering from pneumonia after infection caused by plugging the nostrils with infected cotton. The experiments of Kolle in the use of plague serum upon animals were unsatisfactory in the presence of virulent cultures, but when used against those of lower virulence there were at times favorable results. The Pasteur Institute dried serum caused agglutination and was of use in distinguishing the plague bacillus.

The Indian Plague Commission [2] places the number of deaths in India up to its date of reporting at 430,500. It has proved that abraded surfaces are responsible for the bubonic and septicemic varieties. Primary plague pneumonia needs further study. The incubation period was under three days. The danger from direct infection is very small where there is cleanliness and ventilation, and the wearing of shoes is insisted on. In pneumonic plague, however, a high degree of infectivity is found and this form tends to reproduce itself. At present all convalescents are to be regarded with suspicion so long as any symptoms persist. Of 3035 fatal cases, death occurred within two days in more than one-third; in three days, in one-half, and in 93 per cent. within five days. In the Bombay Presidency, from September, 1896, to June 1, 1900, the mortality percentage was 75.53. The Commission goes into the matter of quarantine and its conclusions seem to point to the futility of any but a rigid quarantine with long periods of detention. It considers that it is of great importance to discover the mode by which rats become infected. That the contagion is received through the mucous membrane of the nose seems most likely, but when plague is once established human agency is more concerned than rats. The disease is independent of climatic conditions, while the conditions inside houses rather than outside determine its spread. Overcrowding only increases the possibility of contact. Sewage pollution in India is very bad and general, but the conditions inside the dwellings are most important, though the President of the Commission does not consider plague a filth disease. If both unsanitary conditions and the disease itself in rats exist, the suppression of a widespread epidemic is practically impossible.

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[1] Deutsche med. Wchnschr., January 2, 1902, p. 1.

[2] Edinb. Med. Jr., February, 1902, pp. 45 and 151.

Burch [1] gives statistics showing the results obtained by using Haffkine's virus in comparison with Yersin's serum. The former has been said to increase the danger of those already incubating the disease, being a toxin itself, but statistics seem to show that Haffkine's virus is harmless and confers a high degree of immunity. The article is well illustrated and contains much valuable information as to the preparation of the serum in India.

Leonard Rogers [2] reports an investigation of the action of different disinfectants required to kill all species of micro-organisms having about the same resistance as the plague bacilli in from 10 to 15 minutes. Acids and potassium permanganate are not reliable. Phenol and the bichlorid of mercury give best results. The solutions required to kill micro-organisms of the character of the plague bacillus on the surface of mud floors was 15 times as strong for phenol and 14 times for the bichlorid as is needed to kill plague bacilli in test tubes in 15 minutes.

Farrar [3] believes that except in pneumonic cases, infection is ordinarily the result of direct infection from the soil, personal communication being unimportant. He points to the localizing tendency of plague and the efficacy of evacuation of the place where the plague exists. The great mortality in India is due, he thinks, to the fact that it is inhabited by a barefooted race. He believes that diseased rats through their excreta contaminate the soil with the specific microbe.

An interesting discussion is reported in the Suppl. Sentimanale al Policlin., June 7, 1902, on the transmission of plague by the fleas of rats and other animals associated with man, as cats, dogs, and mice.

Danysz's Rat Virus.—More experiments with Danysz's rat virus have only served to confirm those published in the article last year as to its inefficiency, where Klein and Williams [4] found that rats fed on cultures of this bacillus suffered a mortality of only about 33 per cent., but when the rats were fed on guinea-pigs which had died from inoculation of the virulent culture the percentage of deaths in the rats was decidedly increased. A difference was found between experiments performed in the laboratory and in a warehouse, the results in the latter being negative. M. J. Rosenau, United States Marine-Hospital Service, performed similar experiments with about the same result. Abel, of Hamburg, succeeded somewhat better, feeding the rats on

[1] N. Y. Med. Jr., September 20, 1902, p. 485.
[2] Jr. of Hyg., April 1, 1902, p. 129, and Indian Med. Gaz., May, 1902, p. 166.
[3] Brit. Med. Jr., August 16, 1902, p. 454.
[4] Lancet, August 17, 1901, p. 440.

bread treated with cultures of the bacilli. This bacillus is said to be harmless to man and domestic animals.

YELLOW FEVER

Agramonte[1] confirms the findings of the American Yellow Fever Commission. He recognized the hyaline bodies described by them, but only in a certain percentage of cases, and on his return to Havana was able to find them also in persons in perfect health. They exist free in blood plasma, are motionless, and while apparently transparent, on more minute examination are found to contain certain minute mobile granules. He suggests that they may be transitional forms appearing in the development of the as yet undecided specific micro-organism.

Gorgas[2] relates the efforts of the sanitary authorities to rid Havana of yellow fever and to destroy so far as possible all Stegomyiæ; receptacles for water were screened as carefully as patients; marshes and ditches filled, drained, and disinfected. Petroleum was used in cesspools and drains and in infected homes and pyrethrum powder was burned, one pound to 1000 cubic feet of space. He believes that it is thoroughness of this work which has wrought the marvellous transformation in Havana.

PNEUMONIA

Wells[3] states that the fatality of pneumonia has increased but little in 80 years. The prevalence has increased for 50 years past and for the last 20 years very greatly. Prophylaxis demands attention in cleansing of the nasal, pharyngeal, and oral cavities, especially if they contain pneumococci. Care should be taken to avoid all secretions containing the specific organism.

Leukocyte Charts in Pneumonia.—It has been known for a long time that the leukocytes in the blood are increased in pneumonia. J. T. Hewetson[4] recommends the use of charts or graphic curves to show their daily variation as an important means in diagnosis and prognosis. He gives an illustration of charts containing three curves and sometimes a fourth or respiratory curve in moderately severe and uncomplicated pneumonia. There is a marked diminution in the number of leukocytes after the crisis. In severe pneumonia the number is maintained for several days after the crisis.

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[1] Rev. med. Cubana, October 15, 1902, p. 259.
[2] Med. Rec., July 19, 1902, p. 81.
[3] Jr. Am. Med. Asso., November 15, 1902, p. 1231.
[4] Birmingh. Med. Rev., August, 1902, p. 84.

Diphtheria Antitoxin in the Treatment of Pneumonia.—Landrieux and Legros[1] have used diphtheria antitoxin in cases of pneumonia. In eight cases in which the injections were begun from the third to the fifth day a sudden fall of temperature was observed twenty-four hours after the second injection, but the same fall was observed in cases treated by cold applications without it. Talamon employed these injections in 50 cases of pneumonia with negative results. The treatment is based on the hypothesis of an increase in the phagocytic action.

Antipneumococcic Serum.—Goldsborough[2] reports 9 cases in which there was marked change within 8 hours after the administration of the serum, and in many the crisis was successfully passed in 48 hours. The dose of 20 c.c. can be repeated in 8 hours. From one to three injections have been used.

Carbonate of Creosote in Pneumonia.—Van Zandt[3] tabulates the replies to the following questions by over 70 physicians who have used this drug. Does it abort pneumonia? They report 1130 cases treated, 37 replies reporting 762 cases believe that it aborts pneumonia; 15 reporting 187 cases say, "No," and 19 reporting 177 fail to answer. To the question whether it mitigates the disease, 57 reporting 1022 cases answer, "Yes;" 2 reporting 10 cases, "No." To the third question, as to whether any cases are totally uninfluenced by it, 23 say, "Yes," and 31, "No." The 5 per cent. of deaths in these cases is accounted for by complications, the ordinary death-rate being 25 per cent.

SMALLPOX

While fewer large cities seem to have been severely affected, the past year has witnessed an extension of smallpox to numerous small towns and villages and into remote parts of the country previously spared. The experience of Cleveland, whose health officer last year thought he had eradicated the disease by disinfection "because vaccination had failed" really enforces the lesson of the value of vaccination and revaccination. An investigation of the actual facts has discovered that at the time disinfection began the number of cases had been reduced by extensive vaccination to about 20. It then as usual disappeared during the summer months of that year, but according to the Marine Hospital report, August 8, 1902, Cleveland had (June 21 to July 26) more cases than any other city in the United States. The

[1] Jr. d. pract., vol. xv, No. 15, 1901, p. 785.
[2] Jr. Am. Med. Asso., June 28, 1902, p. 1681.
[3] Med. Rec., October 18, 1902, p. 601.

question as to whether or not our bovine virus is as good as formerly is important. Perhaps, there will be a return to human virus later on.

Durgin [1] takes the ground that all susceptibility to vaccine should be exhausted before considering the individual safe and immune from smallpox.

Romero [2] reports that in 162 cases, 46 recovered without visible scars and 101 without any trace of pitting, under the use of picric acid in lotion and ointment (picric acid, 2 grams, alcohol, 15 grams, and water, 185 grams).

The aerial conveyance of smallpox is pointed out by Thresh [3] and renders the selection of sites for smallpox hospitals in our large cities a question of great difficulty and of serious consideration.

Thresh [4] describes the epidemic of smallpox in London in the Orselt district, which he traces to the floating hospitals. He believes the infection to have been carried through the air, because the cases could not be traced to any preëxisting cases, and that the distribution of the cases sustain the theory. These cases and the discussion arising from them will tend to modify our views as to the distance that the infection can be carried by air very materially and will undoubtedly influence in the future the problem of locating smallpox hospitals in the built-up parts of the cities.

Edwardes [5] argues for compulsory vaccination as the only safety for communities. With universal vaccination there would be no necessity for extensive isolation. Fox in the same number of the *British Medical Journal* gives a very valuable article on the complications of vaccination.

Wanklyn [6] advises that in the differential diagnosis between varicella and smallpox the examination be made first and the history taken afterward, the distinctive features being in the true skin. Varicella he says, appears first on the trunk, the forearms and hands being lightly involved. The shotty feel and umbilication he considers as of little diagnostic use in obscure cases. The lesion of varicella is superficial; of smallpox, deep. The determining points are the thinness of the covering pellicle, its oval or irregular outline, its long axis parallel to the creases of the skin, its situation in the folds of the axilla and flank, groins, and lumbar region.

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[1] Boston Med. and Surg. Jr., January 30, 1902, p. 114.
[2] N. Y. Med. Jr., October 5, 1901, p. 646.
[3] Lancet, February 22, 1902, p. 495.
[4] Ibid.
[5] Brit. Med. Jr., July 5, 1902, p. 27.
[6] Ibid., July 5, 1902, p. 47.

Smith [1] gives an interesting account of the present available sources of vaccine and the best means of securing good results.

Maude [2] discusses some clinical aspects of revaccination. As a basis he has taken cases which roughly total 1000. He employed lymph from three sources. He describes the character of the pocks and calls particular attention to the areola to which so much attention was paid by old vaccinators, and without which no vaccination was considered valid. In his opinion this was undoubtedly erroneous. He thinks the inflammatory areola is unquestionably due to a second infection by micrococci, and that this areola is quite unnecessary for effective vaccination. He also considers the constitutional symptoms, which he believes are more marked in revaccination than in primary cases and also more pronounced in adults than in infants.

Brewers' Yeast in Smallpox.—Pietri [3] reports his results in 2 cases of confluent smallpox from the use of brewers' yeast. Five or 6 teaspoonfuls were administered daily. There was no suppuration, no fever, and no marks remained.

TETANUS

Tetanus, always a matter of dread whether sporadic or postoperative, has become still more important since the introduction of the use of sera in the treatment of disease and the increase of vaccination owing to the general prevalence of smallpox and the use of gelatin as an antihemorrhagic. From India comes an account of the total arrest of the plague inoculation in an entire district owing to an outbreak of tetanus. In the Gugrat district more than 20 persons who had with difficulty been persuaded to the venture took tetanus and died. The tetanus cases in this country last year stopped for a time much vaccination. The tetanus antitoxin cases in St. Louis brought about the same result.

Krause [4] has collected a number of cases of tetanus following subcutaneous injection of gelatin. He traces it to insufficient sterilization of the gelatin, and advises heating the gelatin solution for half an hour on 5 successive days to 100° C. Margoniner and Hirsch [5] have collected 7 cases. They conclude also that sterilization has been imperfect and advise dissolving the gelatin in warm water and forcing

[1] Boston Med. and Surg. Jr., August 21, 1902, p. 197
[2] Lancet, November 1, 1902, p. 1190.
[3] Méd. mod., vol. xiii, No. 8, 1902, p. 65.
[4] Berl. klin. Wchnschr., July 21, 1902, p. 673.
[5] Therap. Monatsh., July, 1902, p. 334.

through it steam at 100° C. for an hour. Even after this they had abscesses develop. Gradenwitz [1] reports another case successful so far as the arrest of hemorrhage, but which died of tetanus 6 days later.

Willson [2] gives a study of tetanus after vaccination. He states that the mortality is 76.97 per cent. with antitoxin treatment; 82 per cent. without. He objects to glycerinized virus as more irritant, and considers that most of the infections are proved to be secondary.

W. and J. W. Findlay [3] report a case of vaccinal tetanus. The *Lancet* considers the case unique in Great Britain, 1 case in 5,000,000 vaccinations. It states that the vaccination was on the leg and protected by a bunion plaster. All antiseptic precautions were taken in preparing the skin in this case. The material of the once so commonly used shields should certainly be tested to see whether the tetanus bacillus might not be discovered in their substance. The writers in the *Lancet* allude to tetanus in burns as equally mysterious.

The statistics of the treatment of tetanus by antitoxins are as yet unsatisfactory. The spinal subarachnoid method seems to promise most to Pfeiffer, who has treated 14 cases with 50 per cent. of recovery.

Amat [4] publishes five cases in which intracerebral injections were made with good results. He gives 5 drams (20 c.c.) of serum in severe cases and repeats if necessary.

Möllers [5] believes the antitetanic serum to be of little value. The only hope is in its early administration as soon as symptoms appear, and in its use as a prophylactic immediately after injury.

Vallas [6] goes over the whole subject of the treatment of tetanus. As a preventive he has used serum in 20 cases in wounds soiled by dirt and earth where tetanus would be likely to develop. Of 373 collected cases of tetanus, he finds 145 deaths, 39 per cent. Tetanus neonatorum and puerperal tetanus were practically resistant to the treatment. He considers the serum itself safe even in enormous doses. He uses intravenous injections but condemns the intracerebral as dangerous. The subarachnoid is inefficient. Carbolic acid in experiments on animals has not proved specific, but he gives 80 cases in human beings with but 8 deaths.

Maragliano [7] believes that bromide, chloral, and opium give the

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[1] Centralbl. f. Gynäk., September 13, 1902, p. 966.
[2] Jr. Am. Med. Asso., May 3 and 10, 1902, pp. 1147 and 1222.
[3] Lancet, February 22, 1902, p. 506.
[4] Bull. gén. de thérap., July 15, 1901, p. 38.
[5] Deutsche med. Wchnschr., November 21, 1901, p. 814.
[6] Gaz. hebd. de méd., October 5, 1902, p. 481.
[7] Méd. mod., September 4, 1901, p. 287.

best results in tetanus. He gives daily from 200 to 450 grains of chloral with strict isolation, and has found the greatest satisfaction from the antitoxin serum of Tizzoni, of Bologne, which he considers better than that of Behring. Out of 38 patients treated with the serum of Tizzoni, he had 4 deaths, while of 19 treated with the serum of Behring, there were 6 deaths. Extraordinary results have been obtained by the hypodermic injection of carbolic acid as recommended by Baccelli. From 9 to 15 grains (0.6 to 1 gm.) may be injected daily without bad symptoms. Out of 31 cases treated by carbolic acid, there was only one death. He believes this treatment of tetanus is the best. Carbolic [1] acid does not conflict with, or in any way injure antitoxin. Inasmuch as antitoxin is not a stable article, we are not justified in continually saturating the system with this agent of which we know apparently but little. On the other hand, we know considerable about carbolic acid and can ascertain the amount and extent to which it can be used. Cases have been treated alternately, first with antitoxin and then with phenol, with more satisfactory results from the latter.

MALARIA

Studies of malaria and its relationship to the mosquito are still being pursued diligently, and here and there we find dissenters from the broad dictum that all malaria is propagated through the medium of these insects. In New York the Board of Health has decided that malaria is a contagious disease and that all cases occurring must be reported, the patient's room being well protected by screens.

G. Montoro de Francesco,[2] in an article of considerable length and based upon extensive clinical experience, comes to the conclusion that malaria is present in liquids absolutely free of anopheles; that the coexistence of these insects and of infected patients does not necessarily imply that the diffusion of the disease is dependent upon them. He holds to the old point of view that the exhalations from stagnant waters and the breathing of air impregnated with humidity, especially in early morning and late hours in the day, are the most important factors in producing the infection, and that the soil itself is the true habitat of the hæmatozoon.

Charles F. Craig [3] writes of latent and masked malarial fevers, giving his experience with soldiers returned from the Philippines. A study of 195 cases in a routine examination of the blood of returning

[1] N. Y. Med. Jr., July 12, 1902, p. 57.
[2] Semaine méd., May 14, 1902, p. 161.
[3] Med. Rec., February 15, 1902, p. 249.

soldiers showed 150 estivo-autumnal parasites, though tertian infections are said to be most common in the Philippines. Analysis by clinical diagnosis shows the greatest number of masked and latent cases in patients with alimentary disease, and next, in pulmonary tuberculosis. Treatment by quinin in all the apparently tuberculous cases resulted in cure; also in many of the dysenteric cases. Cases of estivo-autumnal fever have occurred in the neighborhood of San Francisco, and have probably been imported by infected individuals from the Philippines. The campaign against malaria in Europe and America is likely to continue, marshes and ponds will be drained wherever possible, and petroleum, which is at present the favored agent, will be extensively used. In Corsica [1] a commission has been appointed to investigate the means of preventing malaria. Its report states that all persons who have previously suffered and inhabitants of very unhealthy places should take quinin in the beginning of summer. It should be given to the poor, especially to children, and sold in all small towns at low prices. Small marshes should be treated with petroleum, especially near houses, and small ponds stocked with fish. The houses should be protected with netting; veils should be worn at night.

Ruskivrakch draws an analogy between malaria and filariasis. He points to Barbados, where malaria is not known to exist, while the filariasis is quite common; anopheles being unknown there, while Culex fatigans, one of the hosts of Filaria nocturna, abounds, seeming to prove that malaria cannot exist without anopheles. Out of more than 600 blood examinations, 76, or more than 12 per cent., were found to be affected with filaria.

Low [2] dissected 100 specimens of culex and found 23 per cent. infected with Filaria nocturna in various stages of development.

Cadwalader,[3] in the study of an epidemic along a river front, notes that 8 out of 18 cases had previously taken water in large quantities, and tries to trace a relation between the ingestion of fluids in large amount and malaria. He cites the common belief that eating watermelons will cause chills, and suggests that increase of water in the blood may play an important part in creating susceptibility. Observations that fit in with this theory are the lack of thirst in malaria, the increased number of cases in summer when the rainfall is heavy, and during the fall rains. Quinin and all such substances, except arsenic, are diuretics. Convalescence is often marked by polyuria.

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[1] Phila. Med. Jr., May 17, 1902, p. 862.
[2] Brit. Med. Jr., June 14, 1902, p. 1472.
[3] Med. Rec., November 1, 1902, p. 695.

TUBERCULOSIS

In tuberculosis the open-air treatment is the thought of the hour. As this treatment is successful in this class of cases, why would it not be equally as efficacious in syphilis and in other constitutional disorders? Sanatoria for consumptives are springing up everywhere, and the Berlin Congress of Tuberculosis, held in Berlin in October, founded a central bureau for the prevention of consumption. Phipps, through Dr. Flick, of Philadelphia, whose interesting article on the diagnosis of tuberculosis in the last volume of the CLINICS will be recalled, has given one million of dollars to found a consumptive hospital in that city. Dickson, in the Baillie lecture, using the parable of the sower as a text, says we must consider the "soil" as well as the "seed" in the study of many diseases, especially tuberculosis.

Bardswell and Chapman[1] have discovered, both clinically and experimentally, that proteid food has a much greater effect in inducing arrest of tuberculous processes than either fats or carbohydrates. The advantages are caused, (1) by the absence of prescribed fats which are disliked by the consumptive; (2) because proteids can be given in large quantity in liquid form, as milk; (3) because it is easier to give it in large quantity; and (4) because the body weight is not upset. This renders it impossible to overfeed the patient.

Lewis states that individual predisposition is far more important in the development of tuberculosis than bacterial infection. The constituting factor of individual predisposition is a pronounced failure in metabolic equilibrium during and preceding clinical tuberculosis.

A. de Léarde[2] states that bronchial emphysema is found in most cases of phthisis, but acute phthisis may be hidden behind marked emphysema. Fibrous phthisis also causes general emphysema.

R. C. Cabot attempts to trace the after history of 300 cases of pleurisy with effusion. He could trace but 152. In none at the time of tapping was there evidence of tuberculosis of the other organs. Of the 152, 80 were found to be in good health at the end of from 5 to 20 years; 37 were well at periods under 5 years; 23 had contracted tuberculosis; and 14 had died of other causes. The family history is of great value in determining prognosis; in fact, of more value than the physical signs at the time of the pleurisy. This paper puts the matter in a much more favorable light than heretofore.

Fischer,[3] from an examination of over 500 cases of musicians using

[1] Brit. Med. Jr., November 1, 1902, p. 1423.
[2] Bull. méd., April 23, 1902, p. 383.
[3] München. med. Wchnschr., April 29, 1902, p. 702.

wind instruments, believes that the popular idea that such players have emphysema is unfounded.

Mignon [1] says that the hair at the entrance of the nares acts as a filter for microbes and dirt, while the normal mucous membrane secretes a fluid mainly bactericidal. When catarrh occurs the secretion is changed and tuberculous infection frequently follows. In tuberculous patients special attention to the nasal fossa is advised.

MISCELLANEOUS MEDICAL TOPICS

Cholera Infantum.—Duval and Bassett [2] have made a preliminary report of their investigation under a grant from the Rockefeller Institute of Medical Research upon the summer diarrheas of infants. From 42 typical cases they succeeded in isolating from the stools *Bacillus dysenteriæ Shiga.* The organism was obtained also from scrapings of intestinal mucous membrane, mesenteric glands, and liver, *post mortem.* In acute cases it was present in the stools in large numbers. In mild and protracted cases, the organism was found with more difficulty. In all respects, however, the bacillus isolated was identical with that isolated by Shiga in Japan, Flexner and Strong in the Philippines, Kruse in Germany, and Vedder and Duval in this country. This bacillus was *not* found in the stools of 25 healthy children, nor in those with simple diarrhea, marasmus, and malnutrition. A full report will be given later in the *Journal of Experimental Medicine.* Cumston's article published in the February and March, 1897, numbers of the *International Medical Magazine,* are of interest in this connection, the work having been done in 1893.

Dysentery.—Chantemesse [3] claims with Widal to have been the first to find the bacillus of dysentery, Cornil reporting the discovery to the French Academy of Medicine in April, 1888. Colin believes that dysentery causes more deaths than plague, yellow fever, and cholera combined.

Whooping-Cough.—Rocaz and Delmas [4] found ozone of use in pertussis during the convulsive period, in doses of from three to four inhalations of three to ten minutes each every twenty-four hours. In the complication of broncho-pneumonia it is of no use.

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[1] Presse méd., January 4, 1902, p. 18.
[2] Amer. Med., September 3, 1902, p. 417.
[3] Presse méd., July 23, 1902, p. 699.
[4] Gaz. hebd., August 7, 1902, p. 740.

L. Baumel [1] uses a 25 per cent. solution of phenol by atomization two or three times a day.

Weill and Péhn,[2] in an extended article upon whooping-cough, state that the contagious period is during the bronchial period, the chances of contagion rapidly lessening as the characteristic cough develops. By the eighth day of the paroxysmal period there is no possibility of the child infecting others. The specific organism may usually be found in cultures from the throat of the child's brothers and sisters. In treatment they regard quinin as beneficial and recommend its use by suppository. Bromoform is too poisonous for general use. Weill advises the external use of antipyrin and inhalation of quinolin, from 10 to 20 drops to 100 c.c. of water boiled in the room for 20 minutes, four times a day. Leuriaux [3] has lately, with success, immunized horses with a bacillus which he has found in the sputum of whooping-cough patients, and by this method has produced a serum which he alleges causes the most favorable results in those affected with this disease, in the course of several days. Sixty-six cases have been treated, and in only five cases did there fail to be improvement. Five c.c. of the serum are used for babes, and 10 c.c. for children over 2 years of age. The previous administration of ipecac is recommended.

Cerebrospinal Meningitis.—Xavier Lewkowicz [4] gives the results of an epidemic of cerebrospinal meningitis; 3 cases of simple meningitis, 11 of tuberculous, and 4 of infectious meningitis. When meningococci alone are found, the prognosis is better even than when pneumococci and mixed infections exist. He lays great stress upon the value of lumbar puncture in the diagnosis, prognosis, and investigation of meningitis.

Dengue.—Graham [5] has studied the transmission of dengue, which is very prevalent in Beirut, Syria, by means of a variety of culex. He found ameboid organisms in the red blood cells closely resembling the plasmodium of malaria, but differing in a longer cycle of production. There is a close resemblance to the parasite of Texas cattle fever.

Influenza.—Felix Franke, of Braunschweig, announces his discovery of a diagnostic sign in this condition, viz., a broad dark red band on the anterior half of the faucial arches, one or two millimeters back of the free edge and parallel with it, varying in width from three to seven millimeters. There is generally a sharp line of demarcation between it and the uvula. The color of the band varies from a vivid

[1] Gaz. hebd., August 7, 1902, p. 740.
[2] Semaine méd., November 27, 1901, p. 385.
[3] Ibid., July 16, 1902, p. 233.
[4] Jahrb. f. Kinderh., vol. lv, No. 3, March, 1902, p. 266.
[5] Med. Rec., February 8, 1902, p. 204.

red to a bluish red. Another characteristic sign, according to Franke, is a swelling of the papillæ on the anterior aspect on the tongue. Franke also found the spleen enlarged on percussion.

Diagnosis of Scarlet Fever aided by the Microscope.—W. K. Jaques [1] has investigated the statements of Class and finds the coccus described by him both in the cases of patients suffering from scarlet fever and in the throats of those exposed to the infection. The coccus resembles *Staphylococcus albus,* is sensitive to environment and readily modified in morphology so that it appears as a diplococcus, streptococcus, or streptobacillus. In the same culture the size varies, but it is very minute. It grows well on blood serum. It varies in pathogenicity. All individuals are not susceptible to it, and in the immune its presence causes no disturbance, or at times merely a local angina. The bactericidal action of the blood soon destroys it, but it penetrates the various tissues and skin. He has by it been able to produce the disease experimentally in swine.

Osteitis Deformans.—J. C. Wilson [2] finds but 10 cases of osteitis deformans reported in North America since Paget in 1877 put on record the first account of this disease. An excellent clinical account of his case is given (Figs. 3, 4, and 5). The prognosis of osteitis deformans is favorable as regards prolongation of life, but absolutely hopeless in the present state of our knowledge as regards cure.

Adiposis Dolorosa.—F. X. Dercum [3] continues to report cases of the condition first described by him of adiposis dolorosa. Fig. 6 shows a recent case complicated by epilepsy.

Kernig's Sign.—When the thigh is extended the ham-string tendons are relaxed, but when the thigh is flexed the leg cannot be extended beyond 135° in consequence of rigidity of the ham-string muscle. This sign was described by Kernig in 1883 as significant of meningitis, and has subsequently been frequently confirmed by others. It may be found in the various forms of meningitis, less often and less marked in tuberculous meningitis. Joseph Sailer [4] reports a case of unilateral manifestation of the sign. The case is exhaustively studied and the necropsy showed ulcerative endocarditis of the aortic valves, cloudy swelling of the kidneys, congestion of the cerebral meninges, and a softened area in the left motor region.

Gastric Ulcer.—Pariser [5] believes that the tender point in the

[1] Jr. Am. Med. Asso., December 6, 1902, p. 1445.
[2] Phila. Med. Jr., February 15, 1902, p. 322.
[3] Ibid., March 1, 1902, p. 396.
[4] Am. Jr. of Med. Sc., May, 1902, p. 772.
[5] Deutsche med. Wchnschr., April 24, 1902, p. 308.

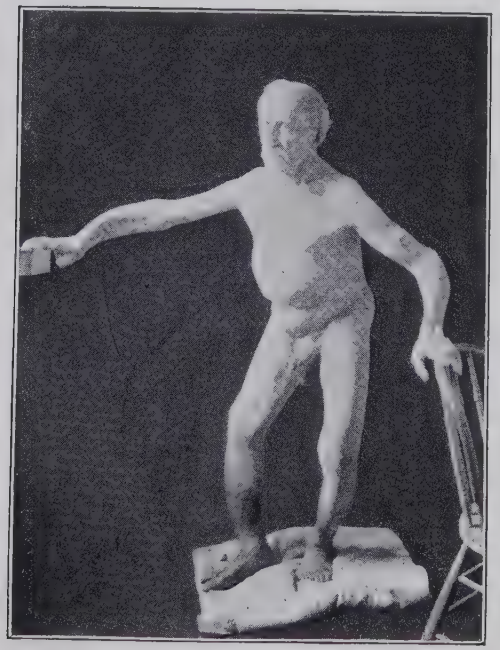


FIG. 3.—Showing changes in the face and long bones, and the characteristic deformity of the chest and abdomen.

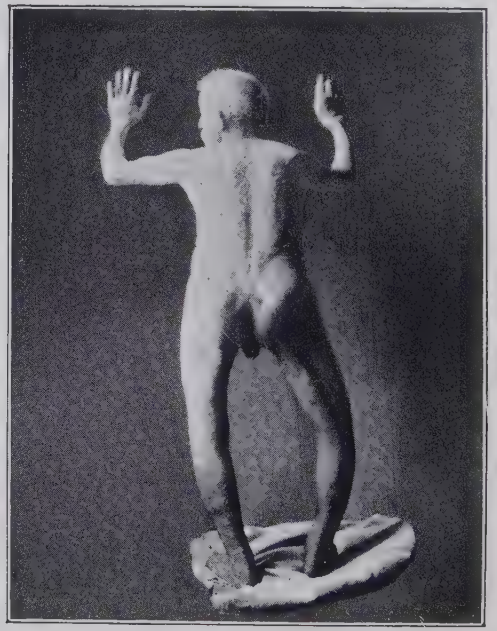


FIG. 4.—Showing curvatures in the bones of the lower extremities.

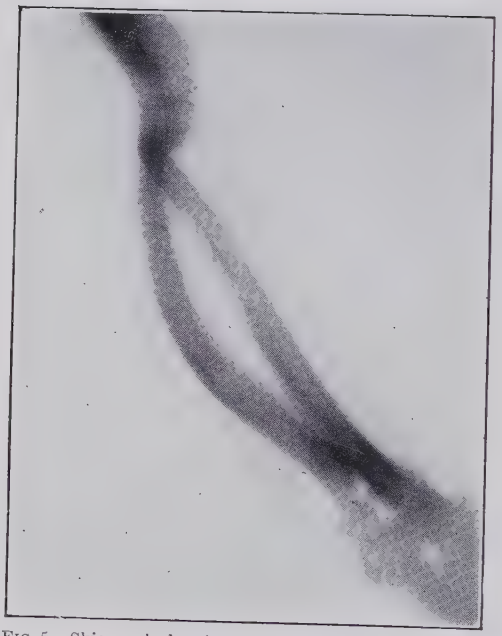


FIG. 5.—Skiagraph showing deformity of radius and ulna.

FIG. 6.—A case of adiposis dolorosa

back is of the utmost importance in the diagnosis of gastric ulcer, and that it is frequently found in that affection. In the treatment he never gives milk without the addition of some form of ground cereal in order that the casein coagulum may be finer and less irritating. He gives also egg albumen and eggs, but believes bouillon to have little nutritive value and to irritate. Nutrose he considers valuable. Meat is denied for a long time. He depends on rectal enemas for long periods, believing that the water absorption from the rectum does the most good and that it is increased by adding small amounts of alcohol.

STOMACH, DILATATION OF.—Thomson[1] says that he has recently made an autopsy in which he found that acute dilatation of the stomach was accompanied by distention of eight feet of small intestine. He remarks that it is reasonable to suppose that paralysis involving the stomach may in certain cases involve long tracts of intestine also. Peritonitis is most often confounded in diagnosis with acute gastric dilatation.

PANCREATITIS.—Great activity, both clinically and experimentally, has been displayed in the study of the pancreas and its secretions. The admirable article by Borissof on the work done by Pavlof[2] and his pupils will be recalled by the readers of the CLINICS as one of the most scientific contributions to experimental physiology published in 1902. Rozánek[3] is of the opinion that hemorrhagic pancreatitis is an acute hemorrhagic necrosis due to the changes induced by hydrochloric acid of the gastric juice gaining access to the head of the pancreas through the duct of Wirsung. He traces the time and cause of occurrence of this disease in women largely to the influence of the menopause.

Opie,[4] from a study of 29 cases of chronic and interstitial pancreatitis, concludes that: (1) Chronic interstitial pancreatitis is slightly more frequent in males than in females; two-thirds of the cases occurring between the ages of 40 and 60 years. (2) The most frequent cause is obstruction of the duct of Wirsung due to pancreatic calculi, to biliary calculi in the terminal part of the common bile duct, or to carcinoma invading the head or body of the gland. Duct obstruction may be followed by the invasion of bacteria, which take part in the production of the resulting lesion. (3) Ascending infection of the unobstructed duct of Wirsung may follow an acute lesion of the duo-

[1] Lancet, August 2, 1902, p. 287.
[2] INTERNAT. CLIN., vol. iii, 12th Series, p. 247.
[3] Präg. med. Wchnschr., vol. xxvi, No. 38, p. 457.
[4] Am. Jr. of Med. Sc., vol. cxxiii, 1902, p. 845.

denum or of the bile passages, and may cause chronic inflammation. In cases which have given a history of long persistent vomiting, chronic diffuse pancreatitis may be found at autopsy, and is probably the result of an ascending infection of the gland. (4) General or local tuberculosis is occasionally accompanied by chronic diffuse pancreatitis affecting chiefly the interstitial tissue of the gland. (5) Chronic interstitial pancreatitis not infrequently depends upon the same etiological factors, notably, alcohol, which produce cirrhosis of the liver, and the two lesions are associated in about one-fourth of the cases. Diabetes results only when the lesion is far advanced (interaciner pancreatitis).

Kratter [1] finds pancreatic hemorrhages to be of frequent occurrence in sudden death. He does not consider it so much a cause as a consequence of sudden death. He believes them to be smaller Tardieu's spots, as in other parts of the body, and to occur in the pancreas owing to its rich vascular supply, the blood escaping owing to the weakness of the walls of the blood-vessels.

Batchelor [2] reports a case of operation in hemorrhagic pancreatitis and recovery of the patient. In the same issue Blumer writes on the pathology of the pancreas and Chittenden on the physiology of the pancreas.

Glenard's Disease.—Keith [3] believes it to be due to a vitiated method of respiration. A variability in the position of the diaphragm is seen after death and is also found in the living subject, as determined by some experiments made by himself with the Röntgen rays. He proceeds to correct some current and erroneous ideas as to the action of this muscle and shows that it will enlarge the thoracic cavity mainly by lengthening it, by depression of the heart and the abdominal viscera when the muscles of the belly wall are slacked, and by increasing in a proportionately gradual measure the width and depth of the chest by the elevation of the lower ribs when the belly wall is resistant, either by reason of its good muscular development, or from the artificial support of corsets. With increase of age there is a loss of resilience of the thorax, the breathing necessarily becomes increased abnormally. A break-down of the resistance of the abdominal wall will tend to ptosis of the contained viscera. In the continued depressing action of the diaphragm break-downs are favored by the growth of intra-abdominal fat in the male but especially in the female during pregnancy, when there is an enormous strain on the abdominal muscles

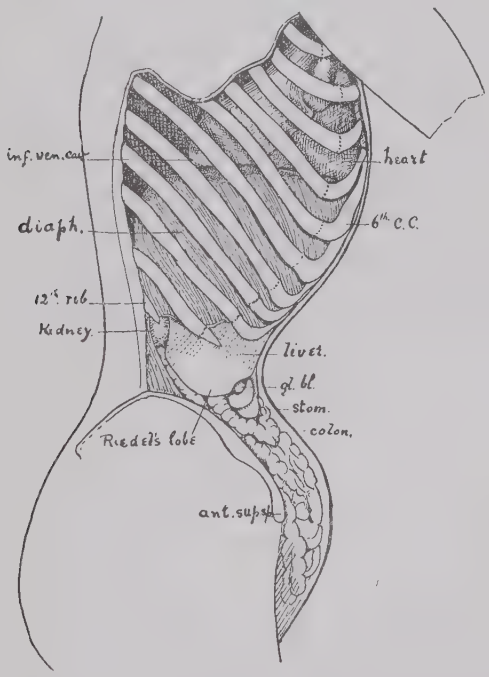
[1] Vrtljschr. f. gerichtl. Med., vol. xxiii, 1902, p. 13.

[2] Med. News, August 9, 1902, p. 249.

[3] Abstract from Lancet, November 15, 1902, p. 1338; original article in London Hospital Gazette.

already weakened and partially atrophied by the wearing of corsets, hence the greater frequency of the disease in the female. He shows an interesting chain of circumstances arising out of the depression of the viscera, the mode of alteration in place of the shape of the stomach, the induced liability to gall stones, the production of diverticulæ of the duodenum, the partial hernia of the stomach through the diaphragm. Fig. 7 shows in a lateral view the position of the viscera in a female body in corsets.

Fig. 7.



Showing the position of the viscera of the right side in a female body hardened in corsets. The direction of the fibers of the diaphragm is shown, and it will be seen that they will tend to push the liver as much forward as downward.

Stiller's Sign.—The tenth rib is normally attached firmly to the ninth costal cartilage by a fibrous band. In those presenting this sign the point of the tenth rib, quite movable, can be distinguished during life at from one and a half to three centimeters from the ninth costal cartilage. Stiller[1] believes that these individuals suffer from

[1] Berl. klin. Wchnschr., 1899, No. 34, and Arch. f. Verdaungskrank., 1901, p. 601.

enteroptosis, or so-called Glenard's disease, with a general descent of the viscera—including floating kidney. The stomach is dilated and atonic, giving symptoms of nervous dyspepsia. Stiller states that nocturnal gastric pains indicate hypersecretion, and gastric cramps in mature, well-nourished women are generally due to gall stones.

Herpes Zoster.—Van Harlingen [1] states that under the name of herpes zoster is to be understood a specific, infectious, and possibly contagious exanthem characterized in its invasion by lassitude, general malaise, chills, rise of temperature, and some digestive disturbance, after which neuralgic pains develop along certain nerve paths with the development of enlarged lymphatic glands. Several days later the characteristic exanthem shows itself and runs its course. Sometimes visceral complications accompany the disease,—paralysis of sensory and motor nerves, inflammations of pleura, peritoneum, articulations, or viscera. The infection attacks chiefly the posterior (sensory) ganglia of the cord and the Gasserian ganglion. Thence the inflammation and degeneration may extend along the nerve trunks and fibers. Zosteroid eruptions, which, however, are to be distinguished from true herpes zoster, often follow coal-gas poisoning, arsenic administration, injury to the nerves, moral shock, grief, and hysteria.

Cystic Kidneys.—Osler [2] states that the clinical features are sufficient for the diagnosis of cystic kidney, which, however, is seldom diagnosed during life. The patient reported by him had blood-red urine for a week, with paroxysmal pain in right side and some distention of abdomen; after getting up, the feet were slightly swollen and the eyelids puffy. After the attack micturition was more frequent by day. A year after, her pulse was tense, the radial and temporal arteries sclerotic, the cardiac impulse was felt in the fifth space in the anterior axillary line, the second sound was accentuated, and both flanks were dull and occupied by large irregular tumors. The red corpuscles were 2,400,00 per c.cm., and the hemoglobin 40 per cent. The specific gravity of the urine was 1007-8, and contained a trace of albumin and a few red corpuscles. Rarely was more urine passed than one liter a day. The patient was discharged from the hospital, but returned in 11 days with urgent dyspnea. The diagnosis of cystic kidney was made from these data.

Graves's Disease.—Campbell [3] often discovers cases of Graves's disease which have escaped recognition. The most important symptoms are extreme nervousness, hand tremor, and tachycardia. The

[1] Am. Jr. of Med. Sc., January, 1902, p. 141.
[2] Am. Med., March 22, 1902, p. 463.
[3] Brit. Med. Jr., November 1, 1902, p. 1420.

patient is often emaciated, perspires profusely, and has a pigmented skin. Those interested in exophthalmic goiter will find an interesting clinical analysis of 120 cases treated by Murray, in the north of England, in the *Lancet,* December 13, 1902.

Intestinal Sand.—Bedford [1] reports a case of true intestinal sand in a woman with a marked history of gout and constipation. Finely granular and yellowish-brown sand was passed to the amount of half a teaspoonful at one time. Analysis showed it to be composed of calcium phosphate 28.68 per cent., calcium carbonate 5.2 per cent., magnesium phosphate 0.49 per cent., organic matter 60.43 per cent., and moisture 5.2 per cent. No trace of urates or uric acid were detected, and the condition seems to be favored by a milk diet. This case must not be confounded with the cases of false intestinal sand published by Delepine, Duckworth, Garrod, and others where it owes its origin to undigested vegetables and particles occasionally coated with earthy salts.

Diabetes.—Ehrmann [2] gives some interesting observations on certain little known cutaneous manifestations of diabetes mellitus. He describes a persistent eczema which yields only to dieting and antidiabetic measures, generally situated on the genitalia, but also on the palms of the hands and soles of feet, and ends of toes and fingers, the dorsum of foot and lower thigh. The skin becomes tough and flakes off leaving clefts which ooze serum and on drying leave their scabs. The patches are sharply outlined like syphilis. Pressure, too, in diabetes often causes redness and excoriation. Ehrmann describes also small hard lumps on the penis mistaken for syphilitic sores which also disappear on antidiabetic diets.

Alcaptonuria.—Garrod [3] confirms the fact that the constant feature of this condition is the excretion of homogentisic acid, to the presence of which substance the special properties of alcaptonuria, the darkening with alkalies on exposure to air, the power of staining fabrics deeply, and that of reducing metallic salts, are alike due. While it is believed that the homogentisic acid excreted is derived from tyrosin, where the change is brought about remains an unsolved problem. The condition is probably due to altered metabolism, is harmless, congenital, and life-long. It does not appear in traces, but in two and one-half to six grams in 24 hours. Of the 32 known congenital examples, 19 have occurred in seven families. Of the 40 known subjects, 29 have been males and a large proportion of children who are first

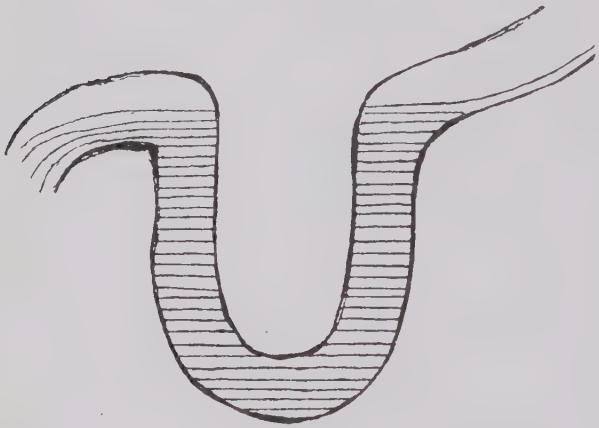
[1] Lancet, July 26, 1902, p. 215.
[2] Wiener med. Wchnschr., October 25, 1902.
[3] Lancet, December 13, 1902, p. 1616.

cousins. Osler reports a case of the condition in the second generation. Garrod traces a similarity to cretinism and to cystinuria.

Leukemia.—A close connection between Hodgkins's disease and leukemia is being more and more dilated upon by various writers, and Wende's case of this character is to be found well abstracted in the *Lancet* of March 15, 1902, p. 762.

Meteorism.—A case [1] of meteorism and partial intestinal obstruction is reported by the late Frederick A. Packard, in which, in spite of a very large number of fluid movements of the bowels in the course of 24 hours, the patient had become steadily distended. The explanation offered by Packard was that the patient had stricture

Fig. 8.



Diagrammatic representation of a loop containing fluid feces, forming a plumber's trap

of the small intestine at a point where the contents of the bowel were still fluid, and that on the proximal side of this stricture there was a loop of bowel so placed that it acted like a plumbers' trap, as in the subjoined diagram (Fig. 8). This condition would permit the overflow of fluid contents, but effectually obstruct the passage of gas. Acting upon this view, Packard administered hypodermically $^1/_{150}$ of a grain of eserin salicylate (and repeated in two hours), after which a remarkable expulsion of gas occurred and the abdomen became flat and soft. The patient died, however, of asthenia nine days afterward. At the autopsy the plumbers' trap arrangement was found in the colon, the transverse portion of which formed a long loop dipping down into the pelvic cavity.

[1] Phila. Med. Jr., May 24, 1902, p. 929.

Myelopathic Albumosuria.—The *Lancet,* October 4, 1902, p. 929, approves of Bradshaw's term myelopathic albumosuria in a portion of the cases known as osteomalacia or mollities ossium. It has come to be recognized that cases of the softening of the bones in adults differ materially from one another. Two groups were named, respectively, osteomalacia and multiple myeloma. It was then further demonstrated that all cases of multiple myeloma were not alike. Some present phenomena of albumosuria, while others did not. Where albumose is found in the urine, and where there is an affection in the marrow, Bradshaw proposes to give the name of myelopathic albumosuria. Multiple myeloma, it is now known, is not always attended by albumosuria. Bradshaw gives a good description of the symptoms and makes some interesting remarks concerning the character of the proteid in the urine, the exact nature of which has not yet been settled.

Striæ on the Nails.—Treves [1] says that striæ of the nails are to be explained as the result of an attenuating histogenic activity depending on causes which produce frequent variations of psychomotor activity. The insane are most liable, and to a less degree, sufferers from morbid affections in general. They are found at times in normal persons. The regeneration of finger nails is much more rapid than in toe nails; the number and depth and position of striæ indicate somewhat the number and duration of the perturbing spells. Normal men showed 16 per cent. of striæ; criminals, 51.7 per cent.; epileptics, 53.8 per cent. Normal women, 12; criminals, 42.8; circular insanity, 77.7 per cent.

Bluish Discoloration of Toes due to Dye of Stockings.—Hall [2] describes three cases of a peculiar bluish discoloration of the skin between the toes. The tint was a peacock blue, and was due to the decomposition of black-stocking dye by the acid of the perspiration.

Sclerosis of the Superficial Veins of the Limbs.—Souques and Janvier [3] describe a typical case of sclerosis of the superficial veins of the limbs in a laborer aged 40 years, with no history of syphilis, but addicted to alcohol. He had incipient bilateral pulmonary tuberculosis. The superficial veins of the lower limbs were symmetrically indurated. The internal saphenous vein could be palpated from the external malleolus to the groin; the external, from the ankle to the thigh. They were smaller than normal, hard and resistant without nodulation. In the upper limbs the condition was also symmetrical and resembled

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[1] Jr. of Ment. Path., December, 1901, and January, 1902, vol. i, p. 215.

[2] Brit. Jr. of Dermat., November, 1902, p. 418.

[3] Bull. et Mém. Soc. Méd. des Hôpitaux of Paris, May 15, 1902, p. 438.

that of the lower limbs. The veins of the trunk, neck, and head were not affected. The condition appeared to have come on gradually, and it caused the appreciable symptoms. The heart was normal, the urine did not contain albumin or sugar. The case is remarkable for the extent of the induration, its perfect symmetry, its localization, its latent character, and the obscurity of the etiology. Letulle, who has studied the anatomy of venous sclerosis in two cases, points out that the lesions differ from those of chronic phlebitis. The indurated vein is like a contracted artery. Its lumen is narrowed and scalloped, and the folds formed by the thickening intima are free from clots. The pathology of the disease is obscure. It has been suggested that it is similar to arteriosclerosis.

Nephrolysin.—Ascoli and Figari[1] consider nephrolysin to be an intermediary nitrogenous compound formed after various injuries to the kidneys, such as nephrectomy and ligature of the ureter. This substance is alleged to play an important rôle in those suffering from Bright's disease and in nephritic cardiac hypertrophy. It has a marked toxic action in the central nervous system, and in animals subdurally injected, death may be caused with symptoms of severe tonic and clonic spasms, tetanic rigidity, interference with respiration, etc.

Auscultation and Percussion.—Vladimiroff describes a method of auscultation with two stethoscopes used simultaneously or a double stethoscope, so that the sounds of the well side can be heard and compared simultaneously with those from the affected side.

Abrams[2] describes a method of auscultatory percussion in which the clavicles, sternum, ribs, and vertebræ are directly percussed without using the finger as a pleximeter. The blow may be light or strong. For superficial or deep examination over the heart, the clavicle or sternum is directly percussed and the stethoscope is gradually moved towards the organ in all directions from the region of the lungs. As the heart area is approached it is shown by a dull tone. The same method may be used to detect liver and spleen dulness.

Blastomycetic Dermatitis.—In a most admirable article on the blastomycetic dermatitis of Gilchrist, Hyde and Montgomery[3] report in detail the clinical, pathologic, and bacteriologic features of numerous cases of cutaneous blastomycosis, 3 of which are published for the first time (Figs. 9 to 16, inclusive).

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[1] Berl. klin. Wchnschr., July 7, 1902, p. 634.
[2] Med. News, November 8, 1902, p. 875.
[3] Jr. Am. Med. Asso., June 7, 1902, p. 1486.

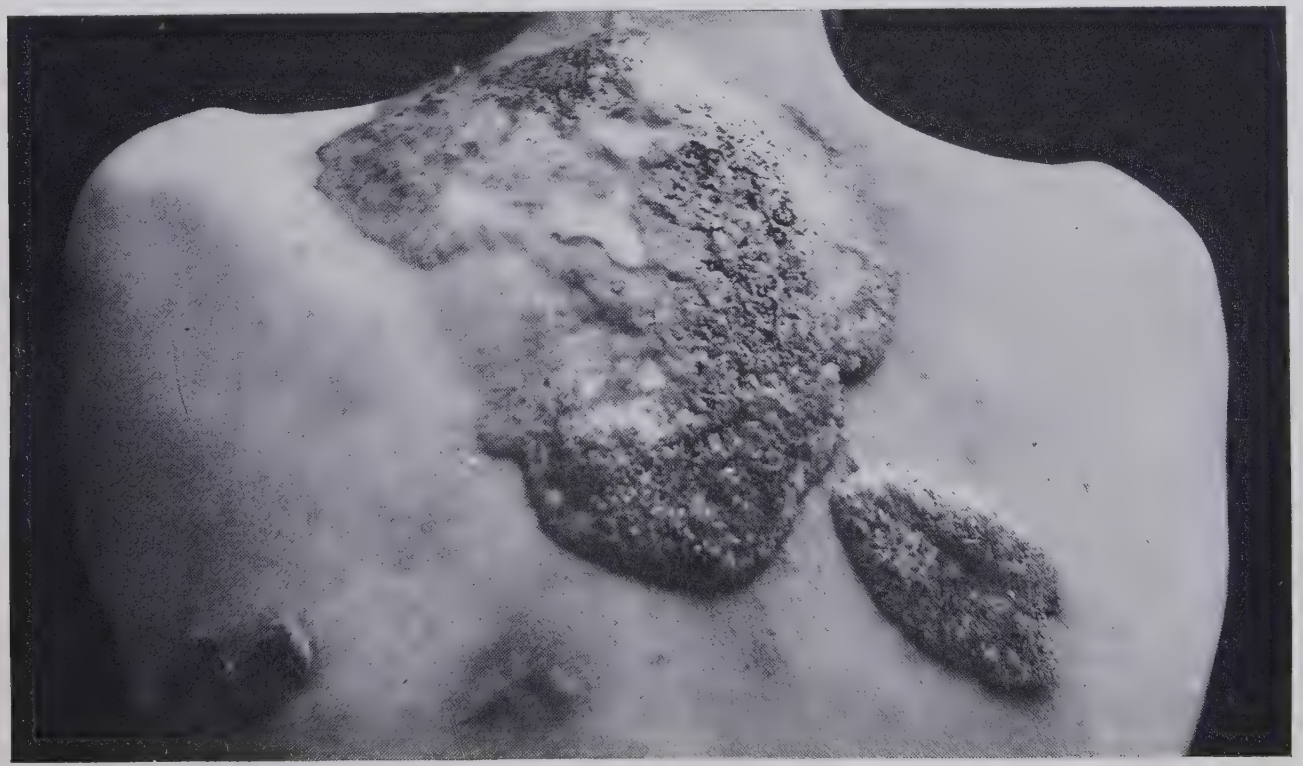

FIG. 9.—Blastomycetic dermatitis of back.

FIG. 10.—Cutaneous blastomycosis around the eyes.

FIG. 11.—Histologic structure of the lesions seen under low power. The epithelial hyperplasia and the miliary abscesses are conspicuous.

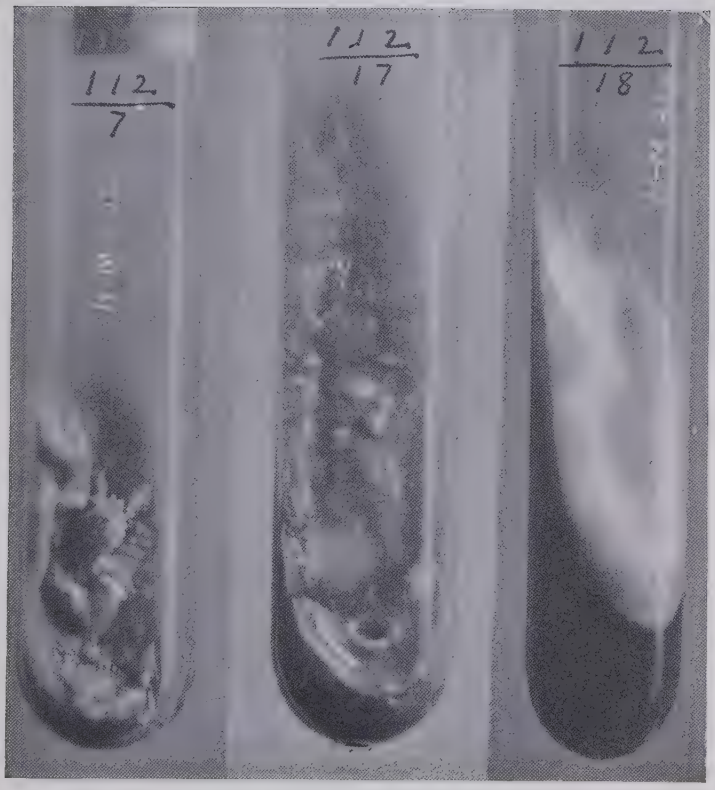

FIG. 12.—Various appearances of the cultures of blastomycetes.

FIG. 13.—Unstained blastomycetes. (Moist preparation; × 1200.)

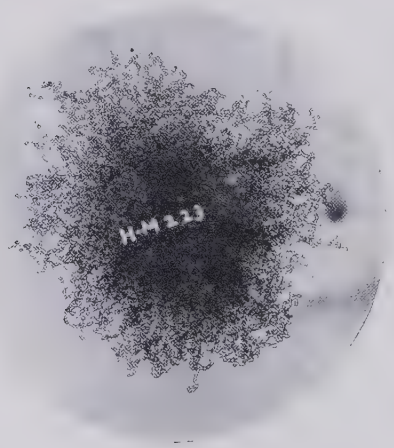

FIG. 14.—Hanging-drop from culture of blastomycete. (× 75.)

FIG. 15.—Higher magnification of hanging-drop represented in Fig. 14. (× 1200.)

FIG. 16.—Smear from a blastomycetes culture stained with methylene blue. (× 1200.)

THERAPEUTICS

Numerous therapeutic discoveries have been made during the past year, some of which may prove of value, though many will fall by the wayside. Here and there some suggestion, quickly forgotten by most readers, may fall on good ground in the mind of some obscure reader, and in his hands work wonders. Many drugs recently introduced have dropped out of sight, while some old remedies have found new and unexpected fields of usefulness, quite foreign to the original purpose for which they were employed. Especial activity has been displayed in the production of new silver salts, many of which have peculiar qualities which recommend them in individual cases. Antiseptics and germicides have been studied even more earnestly in search for that long-looked-for but never found germicide which, when introduced into the human system, will destroy all pathogenic bacteria, yet leave intact the living cells of the organism. Credé thought he had found this agent in collargolum, while the most recent applicant for favor in septicemia is the intravenous injection of 500 c.c. of formalin in the strength of 1 to 5000. We are getting more evidence that sera operate chemically, the lateral chain theory of Ehrlich giving the most satisfactory explanation of the formation of antitoxins and of their actions in the human economy.

Adrenal Preparations.—Adrenalin is 625 times more active than fresh suprarenal gland. When administered in the form of the chlorid, it rapidly produces ischemia of mucous surfaces, so that dentists and oral surgeons employ it for the purpose of performing bloodless operations in the mouth. Internally, in large doses, it causes dyspnea, lowering of the sensibility, diminished reflexes, and loss of voluntary movements. According to Taramasio,[1] death takes place by paralysis of the central nervous system in frogs and by pulmonary edema in mammals. In rabbits 0.02 adrenalin per kilogram, when administered subcutaneously, was always fatal, but never by the use of 0.002 gram. It has been used in conjunctivitis, glaucoma, coryza, laryngitis, otitis media, epistaxis, hemoptysis, and metrorrhagia. Externally it is used in the strength of 1 to 1000 or 1 to 10,000. Hirtz [2] reports two cases of Addison's disease cured while taking one and one-half grains (0.1 gm.) of dry suprarenal gland two to four times daily. Herter [3] believes that

[1] Rev. méd. de la Suisse Rom., No. 8, 1902, p. 589.
[2] Bull. gén. de Thérap., vol. cxliv, No. 4, p. 134.
[3] Med. News, October 25, 1902, p. 769.

from adrenalin we have an hitherto undiscovered action by which sugar metabolism is largely controlled under physiologic conditions. He believes that relatively large applications of adrenalin to the pancreas in glycosuria may serve as a continuous physiologic stimulus to that organ. Both Rosenberg [1] and Kyle [2] praise its use in rhinology and laryngology. Blum [3] has found that glycosuria is not produced in dogs by feeding them on large amounts of adrenalin, but that it does follow the hypodermic injection of this drug. Bronzed diabetes is suggested as being due to affections of the adrenals

Agurin.—Agurin,[4] a combination of sodium theobromate and sodium acetate, is recommended as a diuretic in preference to diuretin.[5] A daily dose of 1 to 3 grams is followed by an increased excretion of urea, phosphates, and chlorids.

Alboferin.—Fuchs [6] reports his clinical experiences with alboferin.

Alcohol and Tobacco. — Alcohol and tobacco, always drugs of interest in a political sense, as revenue is largely derived from them in the form of taxes, have been brought more vividly before the public since the passage of the anticanteen law. Almost a universal protest has risen from those who know most about it, viz., the army officers, but its advocates are generally determined against its repeal. The last annual report of the Secretary of War says: "A great number of additional reports have been received, and they confirm the impression produced by the earlier reports. I am convinced that the general effect of prohibiting the use of beer and light wines within the limited area of the army posts is to lead the enlisted men to go out of the post, to frequent vile resorts which cluster in the neighborhood, to drink bad whiskey to excess, and to associate intimately with abandoned men and more abandoned women. And that the operation of the law is to increase drunkenness, disease of the most loathsome character, insubordination, and desertion." This is plain language, but it may be doubted whether it will change the views of the ultra temperance men and women one iota. They care only for the ideal and disregard the practical.

Sir Thomas Barlow,[7] discussing intemperance in women, believes

[1] Ztschr. f. Ohrenh., vol. xli, No. 2, p. 152.
[2] Therap. Gaz., July 15, 1902, p. 438. (Literature.)
[3] Deutsche Arch. f. klin. Med., vol. lxxi, No. 2, 1901, p. 146.
[4] Am. Druggist, vol. xxxix, 1901, No. 11, p. 349.
[5] Therap. Monatsh., May, 1902, p. 275.
[6] Wiener klin. Wchnschr., February 27, 1902, p. 233.
[7] Lancet, December 20, 1902, p. 1707.

that heredity does in some families play a small part in its causation, but that it is principally due to habit and environment. Moral responsibility must be insisted on. Friends must aid, especially by their example of abstinence. The intemperate woman cannot be temperate in the strict sense of the word. Alcohol in these cases should never be advised as a stimulant.

Seaver,[1] the director of physical culture at Yale University, has prepared data substantiating those of Hitchcock on the injurious effects of tobacco on the mind and body of students. He finds that (taking the figures for 9 years) the smokers average 15 months older than the non-smokers, and that their size in all but weight was inferior. The height of the non-smokers was 7 mm. greater, their lung capacity 80 c.c. greater, and their weight only 1.04 kilograms less, though over a year younger. To estimate the effect of tobacco when they reach full maturity on boys from 16 to 25, a comparison was made of the men of one class which was divided into three groups, the first not using tobacco, the second using it regularly, the third, irregularly. During undergraduate life, essentially 3.05 years, the first group grows in weight 10.4 per cent. more than the second, and 6.6 per cent. more than the third. In height the first grows 24 per cent. more than the second, and 11 per cent. more than the third. In girth of chest the first group grows 26.7 per cent. more than the second, and 22 per cent. more than the third. In capacity of lungs the first gains 77 per cent. more than the second and 49.5 per cent. more than the third.

The *Lancet,* February 1, 1902, p. 327, in an article on the co-operation of alcohol and tobacco, says that it is undoubted that the poisonous effects of tobacco are much intensified by the indulgence in alcohol. The powerful solvent action of alcohol explains this sufficiently. Nicotin and pyridin bases are very soluble in alcohol. Pyridin, which is the chief poisonous constituent of tobacco smoke, is not so soluble in water as in alcohol. Pyridin bases can be easily found in the smoker's mouth and an alcoholic drink is calculated to wash this out and carry it to the stomach. Much headache and malaise could be avoided in smokers by their abstaining from alcohol when smoking or by their causing the smoke to pass through water, as in the use of the hookah.

The *Practitioner,* of November, 1902, in its special alcohol number, also contains many points of interest based on the personal experiences of such noted writers as Woodhead, Sir Henry Thompson, and Sir Samuel Wilks.

B. T. P. Barker, at a meeting of the British Association for the

[1] Amer. Med., September 13, 1902, p. 403.

Advancement of Science, at Belfast, September 17, 1902, gave an account of samsu, a distilled liquor, somewhat like arrack, prepared from rice and used in Eastern Asia. The rice is boiled in water and then a powdered substance is added to produce fermentation. Three successive distillations are employed. The powdered substance in the form of small round grayish cakes was examined by Gwynne Vaughan. Pepper and fruit of some kind formed a part, and on adding some of it to boiled, sterilized rice, a fungoid growth soon appeared and a red or purple coloration was produced—due to a species of monascus. A bacterium capable of fermenting glucose was also isolated. The process was interesting in the fact that it is performed by a fungus which converts the starch of the rice to glucose and by a bacillus which carries on the glucose to alcoholic fermentation.

Anesthesin.—This substance, a member of the orthoform group, is a white, odorless, and tasteless powder, soluble in ether, alcohol, and oils. Applied to wounds, it diminishes pain and promotes healing, Spiess [1] believing that there is a direct relation between these two conditions. It has been administered in two gram doses and upward without toxic effect, and in this respect is superior to cocain. It is useful in whooping-cough and in coryza, as dry inhalations, especially in children. The only untoward effect has been in one case of eczema.

Aspirin.—Görges [2] recommends aspirin in place of the ordinary salicylates, stating that it gives rise to fewer unpleasant symptoms. To a child of eight he gives 15 grains (1 gm.) daily. He uses it also in chronic as well as in acute rheumatism, chorea, rheumatic endocarditis, and neuralgia. A case of acute gout was cured in four doses. It has to be used with caution, however, never being continued longer at a time than five successive days. During the administration of aspirin there was a slight rise in the excretion of ethereal sulphates. Singer [3] believes that there is no evidence that aspirin actually reduces the fermentation in the intestines.

Atoxyl.—Atoxyl [4] is a white, odorless powder of a slightly salty taste, soluble in water, and containing 37.69 per cent. of arsenic. Hypodermic injections of an aqueous solution can be given where high doses of arsenic are required and without any bad effect in chronic skin diseases, alopecia areata, sarcoma, chronic dermatitis, keratiasis, and lichen ruber.

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[1] München. med. Wchnschr., September 30, 1902, p. 1611.
[2] Therap. Monatsh., September, 1902, p. 472.
[3] Ztschr. f. klin. Med., vol. xliv., p. 168.
[4] Berl. klin. Wchnschr., March 31, 1902, p. 279.

Atropin.—Adolf Weber [1] has had favorable results with this remedy in cases of colic due to lead poisoning. He prefers it to belladonna, giving it in doses from one-sixtieth to one-twentieth of a grain (0.001 to 0.003 gm.). Prompt relief generally follows, except in cases in which opium has been previously administered.

Bismuthose.—Lissauer [2] describes favorably 30 cases of diarrhea in children treated with this preparation.

Boric Acid.—The question as to whether boric acid is toxic when used as a preservative is assuming international importance owing to the German Government forbidding the entrance into Germany of American goods preserved with it. Professor Wiley, of the Department of Agriculture, is making experiments on a large scale on a number of persons to test this question. For further references on this subject, see "Food Preservatives," p. 295.

Eleven enlarged thyroid glands have been treated by Kyle [3] with boric acid, a mode of treatment which he accidentally discovered. In each case in which the treatment has been followed out the result has been the same, either entire diminution of the enlargement or such a marked diminution that the patient was no longer inconvenienced. The dose used was from 10 to 15 grains (0.6 to 1 gm.) of boric acid in capsules taken with a full glass of water every three hours. While urotropin has replaced borax to a large extent, it should not be forgotten that in this medicament we have a valuable non-toxic drug in the treatment of bladder troubles.[4]

Cacodylate of Sodium.—Mendel [5] says that cacodylate of sodium is absorbed from the stomach, though he usually employs the drug hypodermically, commencing with 3 grains (0.2 gm.) daily. In chlorosis he has obtained by its use a cure in four to six weeks. His result in tuberculous conditions was not so brilliant as in some other conditions, but he claims a distinct increase in the patient's weight, as was also the case in diabetes. Of two patients with exophthalmic goiter, one was not affected, the other was much improved. In neuritis he even injected 0.75 gm. directly into the inflamed nerve with good results.

Carbonic Acid Baths.—Battistini and Rovere [6] have studied the action of artificial baths on 13 patients. The bath usually gives an increase in arterial tension, slowing of the pulse, and regulates the

[1] München. med. Wchnschr., vol. xlix, No. 17, 1902, p. 704.
[2] Deutsche med. Wchnschr., August 14, 1902, p. 599.
[3] Amer. Med., February 8, 1902, p. 246.
[4] Therap. Monatsh., November, 1902, p. 606.
[5] Ibid., April, 1902, p. 178.
[6] Jr. d. pract., vol. xiv, No. 17, 1902, p. 270.

irregular working of the heart and quiets painful sensations and palpitation.

Carbon Monoxid.—See "Illuminating Gas."

Chielin.—Chielin, derived from tulip bulbs, is recommended by Heymann [1] in the form of cream or soap in the treatment of chronic eczema, itching skin diseases, and acne.

Chlorinated Lime.—Several cases of explosion in opening hermetically sealed cans containing chlorinated lime have been reported. These could have been prevented by pricking a hole in the lid before removing it.

Citrophen.—Syers [2] has found citrophen of use as an analgesic in doses of 10 grains (0.6 gm.) in neuralgia, lumbago, and sciatica. It is not, however, an antipyretic.

Creosote. — Thomalla [3] reports a positive cure of tuberculous meningitis by creosote, the patient taking in nine months 2200 capsules of creosote, each containing 0.5 gram.

Cyanogen.—Hydrogen cyanid made by dropping cyanid of potassium into sulphuric acid, one part, and water, two parts, has given good results as a disinfectant, as pointed out in last year's article.

Digitalis.—Görges uses dialyzed digitalis, as being of more uniform strength and constant composition than the ordinary preparations of this drug.

Dormiol.—Dormiol, dimethylacthyl carbinochloral, has been used by Hoppe [4] in the treatment of the status epilepticus. The remedy is presented in aqueous solution of 10 grams in 150 c.c.; 2 to 3 teaspoonfuls (5 to 15 c.c) of this preparation are administered in one-fourth to one-third of a liter of lukewarm water. The dose is repeated if required.

Electricity.—Gescheit [5] reports a case of Ménière's disease associated with chronic inflammation of the mucous membrane of the cavity of the tympanum, in which the positive galvanic pole was placed on the tragus of the affected ear and the negative pole in the region of the cervical vertebræ. After the hyperesthesia of the affected ear had disappeared the poles were placed on both tragi. After two treatments the dizziness had disappeared, and after twenty-five treatments he experienced no more attacks, his gait became steady, and he returned to

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[1] Deutsche med. Wchnschr., No. 33, 1902, p. 599.
[2] Treatment, January, 1902, p. 814.
[3] Berl. klin. Wchnschr., June 16, 1902, p. 565.
[4] München. med. Wchnschr., April 29, 1902, p. 701.
[5] Berl. klin. Wchnschr., April 7, 1902, p. 304.

work. The current used was 3 to 4 milli-ampères, the treatment being administered for 3 minutes every other day for three months.

Epithol.—Epithol, gold, and epithol, silver, are composed of a finely powdered alloy of zinc and copper, and are used as a dusting powder in veterinary practice.[1]

Food Preservatives and Colorations.—Victor C. Vaughan and W. H. Beenboer [2] publish the results of their researches on boric acid and borax as food preservatives. J. F. Rinehart [3] showed that mental dulness might in some cases follow the use of borax and boric acid, if used in considerable quantity, or even when applied to some surfaces of the body; while Liebreich, of Berlin, considers boric acid harmless to the dog in 3 grain (0.2 gm.) doses daily; and while fresh foods could be preserved, decomposed foods could not be restored to the fresh state. Meat exported from America to England and butter sent from America and Australia to England were found to contain boric acid. Vaughan and Beenboer stated the relative amount of bacterial growth in chopped meat, bacon, cream, and butter treated with varying quantities of boric acid up to one per cent. and exposed to the air for a certain number of days. Boric acid mixed with chopped meat was exposed three days to a temperature slightly below the freezing point and then placed indoors at a temperature between 15° and 25° C. Loop cultures were made at intervals on gelatin and agar plates and the number of bacteria estimated. The conclusion was that while small quantities of boric acid preserved the meat, they did not entirely prevent bacterial growth. In cream the bacterial growth was still greater. "Meat without boric acid when kept at ordinary temperatures became 'slimy' within a few days." From the surface of the meat, cultures containing many different kinds of bacteria were obtained. Ham, bacon, and meat sprinkled with boric acid were thereby prevented from becoming "slimy." Many other experiments have been carried on in regard to determining whether boric acid has toxic effects upon the system, even babes being fed with milk preserved with boric acid. Miro [4] contends that it is toxic.

Kionka [5] finds that sodium sulphuret is used in meat preservation and that it possesses marked toxic properties. Animals experimented

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[1] Therap. Monatshefte, November, 1902, p. 583; abstracted from Berliner Thierärztliche Wchnschr. No. 1, 1902.

[2] Amer. Med., March 15, 1902, p. 421.

[3] Lancet, November 30, 1901, p. 1514.

[4] Rev. méd. Cubana, July 15, 1902, p. 49.

[5] Deutsche med. Wchnschr., February 6, 1902, p. 89.

upon showed hemorrhagic infiltration, vascular changes, and inflammation of the lungs and kidneys.

Methyl orange is used in coloring milk. Annotto, the dye most commonly employed for this purpose, cannot be said to possess toxic properties, but an agitation is on foot in England to prevent the artificial coloring of milk.

Copper and arsenic are largely used in the extermination of parasites upon vegetables and fruits. A recent bulletin of the Ohio Experimental Station shows that one-fortieth of a grain of copper to a pound of grapes was the largest amount recovered from well-sprayed grapes, and of jelly prepared from them, one-twentieth of a grain of copper to the pound. This quantity of copper is stated not to be dangerous, two persons experimented upon having eaten the jelly without deleterious results.

Foods.—The juice of the pineapple [1] has been found to contain an active digestive principle analogous to pepsin—called bromelin—which is capable of digesting 1000 times its weight of proteids in a few hours, the time varying with the variety of proteids employed. Fibrin disappears entirely. With albumen the process is slow; with meat there is first produced a gelatinous mass which finally dissolves. A slice of pineapple placed upon raw beef causes it to become gradually gelatinous. The juice of the pineapple being so easily obtained in large quantities would seem to make it of practical use. Cooking destroys the active principle. This active principle will operate in any medium, whether acid or alkaline.

Recent observations on the mushroom [2] have caused a very material change in the conclusions from those reached formerly, the mushroom lacking almost entirely the proteids found in meat, ten pounds of mushrooms being required to equal in this respect one pound of good beef; so that the mushroom, so far as its food value goes, may be classed with the use of ordinary fresh vegetables. The mushroom, however, owes to its carbohydrates some dietetic value, and its large proportion of potassium salts and flavoring for other food make it useful. But owing to the liability to error in selecting edible mushrooms, its use is not without danger.

Harting [3] finds that the iron value of eggs can be markedly increased by feeding hens with food rich in iron, though as a therapeutic measure eggs are useless for the administration of iron, as it takes 36 eggs to

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[1] Lancet, June 7, 1902, p. 1614.
[2] Ibid., March 15, 1902, p. 761.
[3] Ztschr. f. Biol., 1902, p. 195.

supply an amount of iron weighing one and one-half grains (0.1 gram). Various methods have been recommended for the preservation of eggs. They have been immersed in fluids and kept dry, and greased as soon as possible after they are laid. This latter method has been very successful, eggs having retained their flavor for several months. Eggs have also been immersed in a solution of silicate of sodium, forming an air-tight coating. These eggs are said to keep well for 6 months.[1]

Thesen [2] has given a study of the various forms of mussel poisoning, but more especially the paralytic type in which peripheral paralyses occur resembling those in curare poisoning. The poisonous principle is not supposed to be elaborated by the mussel itself, but it is stored up by extraction of poisonous substances present in the surrounding water. It is not safe, therefore, to use mussels for food which are obtained from harbors in which such poisonous substances exist.

Ferisol.—Ferisol [3] is a soluble powder derived from cinnamic acid and guaiacol. Dose, 15 grains (1 gram). Hypodermically, 15 minims (1 c.c.) of a 10 per cent. solution, which may be increased to 45 minims (3 c.c.) daily.

Formaldehyd.—De Lamalleree [4] employs inhalations of formaldehyd vapor in whooping-cough. He vaporizes over an alcohol lamp a paraform tablet (15 grains) for an hour, tightly closing the room. In 20 cases the vomiting ceased in from 1 to 3 days. The attacks of coughing, numbering 18 to 37 in 24 hours, fell to 2 or 3 after 48 hours at the outside. Of 22 cases there were 2 unsuccessful, 4 responded slowly, and 18 were cured in 8 days. The patient should be seen in the first 8 or 10 days of the disease and kept in a well-closed room at a moderate temperature.

The report of the Chicago Public Health Department, No. 24, October 25, 1902, suggests the value of formaldehyd gas in aborting catarrhal conditions which favor the development of pneumonia, bronchitis, and influenza.

Formaldehyd has been successfully used by Solovier and Demidor, two Russian military surgeons, in the treatment of favus. A compress wet with a five-eighth per cent. solution of formalin is employed. Ssolowjen [5] also reports 12 cases favorably treated by this means.

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[1] Lancet, January 18, 1902, p. 183.

[2] Arch. f. exper. Path. u. Pharmakol., vol. xlvii, Nos. 5 and 6.

[3] Phila. Med. Jr., November 8, 1902, p. 703; abstracted from Rev. de thérap., vol. lxix, No. 9.

[4] Jr. méd. de Brux., vol. xvii, No. 19, 1902, p. 298.

[5] Therap. d. Gegenwart, January, 1902, p. 38; abstracted from Wojenno-med. Jr., No. 4, 1901.

In diphtheria painting the mucous membrane and the tonsils with a swab saturated with formalin has been recommended, though S. S. Cohen believes that in true diphtheria the application is of no permanent benefit. The application is very painful for a short time.

Gas Injections.—Romme [1] and Vigne [2] have obtained excellent results in affections of the nerves, especially of the sciatic, by making pressure upon the nerve through injections into the surrounding tissue of quantities of gas. Vigne experimented with carbonic acid gas, hydrogen, and air. The best results followed the use of air, which both prefer. These injections are quite harmless. Romme employs an aspirating pump and a rubber bag to measure the quantity of air. Vigne uses a hypodermic needle attached to the bulb of a Paquelin cautery. The air is passed through a glass tube filled with cotton, but unfiltered air has been injected without harm. The needle is introduced within the painful spot and a pint of air injected with caution. Some itching and numbness follow. The skin is first pale and then red. The affected parts should be massaged vigorously to distribute the gaseous matter. Cases of sciatica are completely cured by four or five injections at intervals of five or six days. It was found valuable in femoral neuralgia, in lumbago, and in neuritis, especially when of a traumatic nature.

Cordier [3] has also used air with good results for over seven years in amounts of one-half to two liters in the subcutaneous tissues, carefully avoiding the veins and using massage after the injection to distribute the gas in the affected areas. He finds it useful in neuralgia, neuritis, sciatica, and joint diseases. The air may be purified by passing through cotton and glycerin.

Gelatin.—Sereni [4] reports two cases of purpura hemorrhagica in which complete recovery took place under treatment by gelatin used by enteroclysis. By this method both pain and danger are avoided. It has been administered by Rocchi with 50 c.c. of a 2 per cent. solution of gelatin introduced into the bowel, which he thinks is more rapidly absorbed than is the same quality of a 1 per cent. solution injected subcutaneously. The effect becomes noticeable after 10 minutes and lasts six hours. The bowel must be first flushed with boiled water. Fifty c.c. of a 6 per cent. solution of gelatin in distilled water

[1] Amer. Med., December 20, 1902, p. 990, abstracted from Presse méd., May 28, 1902, p. 511.

[2] Ibid., abstracted from Jr. de méd. et de chir. prat., March 25, p. 224.

[3] Lyon méd., 1902, vol. xcviii, pp. 429, 490.

[4] Therap. d. Gegenwart, February, 1902, p. 92; abstracted from Policl. Supplem., vol. vii, No. 46, 1901, p. 458.

containing about 0.75 per cent. of sodium chlorid and a few drops of laudanum are then injected under moderate pressure at normal bodily temperature. This method is applicable to all cases requiring the use of gelatin administered by the stomach. The opinion of Lancereaux is that the gelatin solution is taken up by the lymphatics; that no reaction takes place at the bleeding points, and that the clot begins to form at the injured intima of the bleeding vessel. The nature of this reaction has been studied by Zibell,[1] who attributes the coagulation of the blood to calcium contained therein, and believes that increase in coagulation follows the addition of an excess of calcium in the blood. This has led in the past to the administration of inorganic salts of calcium in hemorrhage. Zibell suggests that gelatin forms a means for the prompt administration and easy diffusion of calcium. About 0.6 per cent. of the gelatin of the shops is calcium.

Margonier and Hirsch [2] found hypodermic injections of gelatin of especial value in pulmonary hemorrhage, but cite a number of instances in which tetanus has developed after its use.

Gelon.—Various substances, such as ichthyol, chrysarobin, salicylic acid, etc., are incorporated in this easily applied plaster.

Glass, Action of Water and Bacteria on.—Water and other fluids are found to have a distinct action upon glass.[3] Neutral, pure, distilled water will dissolve the alkali in glass and show an alkaline reaction after a short time, and a deposit of silica will be found at the bottom of the vessel. A peculiar glass disease is said to have broken out in the windows of York Cathedral, some of the glass having to be removed to arrest it. The disease is ascribed to a fungus, and the glass becomes perforated so that it yields on the slightest touch, its transparency and strength disappearing. The fungus must be one which is capable of assimilating silica, as bacteria are known to exist which attack deposits of pure silica and cement. In a similar manner certain moulds act on arsenical wall-paper and produce diethylarsin.

Glucose in Exhausting Diseases. — Barker [4] advocates in exhausting diseases subcutaneous injections of glucose in 5 per cent. normal salt solution. One-half liter twice daily is used for several days before and after operations on exhausted patients.

Glycocholate of Sodium.—Sodium glycocholate is being used as a stimulant to the liver. Keown [5] shows that, injected into the blood,

[1] München. med. Wchnschr., October 15, 1901, p. 1643.
[2] Therap. Monatsh., 1902, vol. xvi, p. 334.
[3] Lancet, October 18, 1902, p. 1069.
[4] Brit. Med. Jr., March 29, 1902, p. 770.
[5] Jr. Am. Med. Asso., August 16, 1902, p. 371.

this salt acts as a destroyer of red corpuscles. In small doses it is depressing to the circulation, but its principal action is in stimulating the liver. It is recommended in ichthyoid conditions dependent on insufficient hepatic activity and in gall stones on account of its solvent action.

Guaiacol.—In spasmodic contractions of the uterus guaiacol is recommended in doses of 10 to 20 drops, being rubbed gently over the organ. Equally good results are said to be obtained in cases of muscular pain. The valerianate of guaiacol (geosot) is used by Kühn [1] in the treatment of pulmonary tuberculosis. The dose is one-third to two-thirds of a grain (0.2 to 0.4 gm.), and it is best administered along with a tonic, such as gentian.

Guaiacol in Extracting Teeth.—B. Marechal [2] recommends this drug as an antiseptic for dental use. Dissolved in sterilized olive oil, 1 gram to 10 c.c., it is a powerful antiseptic, and also an analgesic and antineuralgic in the treatment of painful pulpitis. He injects it directly into the gums.

Hedonal.—Tendlau [3] and Hepna recommend the use of hedonal as a hypnotic in doses of from 15 to 60 grains (1 to 4 grams), as it appears to be safe and is useful in painful affections.

Hetol.—Amrein [4] reports the results of treating tuberculosis with this drug between 1899 and 1901. He injects 1 milligram, and the injections are repeated every third day until 10 milligrams have been reached as the maximum dose. Of the cases treated, a positive success was obtained in 13; in 4 the patients had been undergoing a cure treatment in high altitudes.

Hetol [5] has been used by Krause for over two years for treating tuberculosis of the lungs and larynx. Of 21 cases, 4 were cured and 17 improved; appetite and weight increased. The remedy was used by injection after the method of Landerer.

Histogenal.—Monneyrat [6] calls attention to this new phosphorated arsenical compound, a combination of neucleinic acid with sodium methylarsenate. The daily dose, 1 teaspoonful (5 c.c.), containing three-fourths of a grain (0.05 gram) of methylarsenate and 3 grains

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[1] Therap. Monatsch., November, 1902, p. 567.

[2] Revista de la associación médico farmacéutico de la Isla de Cuba, vol. ii, No. 7, 1902, p. 449.

[3] Forts. der Med., No. 5, 1902, p. 162.

[4] Lancet, July 12, 1902, p. 67.

[5] Berl. klin. Wchnschr., October 20, 1902, p. 976.

[6] Amer. Med., October 25, 1902, p. 674; abstracted from Méd. mod., vol. xiii, No. 12, 1902, p. 104.

(0.2 gm.) of neucleinic acid. It is employed with benefit in tuberculosis, expectoration becoming nearly normal after a month's treatment.

Hydrastis.—French [1] uses hydrastis in all forms of catarrh, in rhinitis, locally and internally, and in cystitis and gastritis. It contains two alkaloids, berberin and hydrastin. Berberin is a bitter tonic and has been used in malaria with or without quinin. Dose, one-half to 3 grains (0.03 to 0.2 gram). In malaria it is given to the extent of 15 to 20 grains (1 to 1.3 grams) in 24 hours. Hydrastin constricts the vessels generally and is an especial stimulus to the uterus.

Hydrochloric Acid.—Soupalt [2] states that in patients suffering from idiopathic diarrhea, and in attacks brought on by emotion, fatigue, or exposure, there is shown on analysis a deficiency of hydrochloric acid in the gastric juice. The administration of hydrochloric acid in doses of from 15 to 30 drops (1 to 2 c.c.) daily gives good results, improvement following rapidly and complete cure in a short time. No especial diet is required.

Hyoscin.—Hare [3] reports several cases of morphin habit treated by Lott's method with massive doses without evil effects. As much as one-fourth of a grain (0.015 gram) in divided doses was given daily, and continued notwithstanding the characteristic symptoms which gradually passed off.

Hypodermoclysis.—Kütner [4] cautions against the use of Tavel's solution composed of sodium chlorid to which calcined sodium carbonate has been added to render it alkaline, as a substitute for the physiologic salt solution. Six consecutive cases of cutaneous gangrene developed after its use, one of which proved fatal. Similar experiments on dogs showed like results.

Ibogain.—Dybowski and Landrin [5] have isolated this alkaloid from a plant, iboga, which is indigenous to the Congo region. It acts directly on the brain centers, increasing blood pressure and diuresis, excites secretion, and raises bodily temperature. In large doses it produces hallucinations with paresis and inco-ordination of movements. Excessive doses cause death by paralyzing the respiratory muscles.

Ichthyol.—Polacco [6] has had good results from ichthyol baths in typhoid fever. Two ounces (60 c.c.) of ichthyol are dissolved in the bath having a temperature of 82° F., the bath lasting from 10 to 15

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[1] Merck's Report, 1902, vol. iv, p. 345.
[2] Rev. de Therap. med.-chir. Par., vol. lxix, 1902, p. 223.
[3] Med. News, June 7, 1902, p. 1076.
[4] Beitr. z. klin. Chir., vol. xxxv, 1902, p. 272.
[5] Semaine méd., December 18, 1901, p. 420.
[6] Bull. gén. de thérap., December 15, 1901, p. 877.

minutes, the temperature of the water being lowered later on to 71° F., each patient receiving from two to six baths. The fever was notably decreased. In all cases the course of the disease was modified and shortened.

Illuminating Gas.—T. J. Yarrow [1] dwells upon the importance of recognizing chronic cases of poisoning from illuminating gas. Gas fittings are seldom perfect and persons exposed to a constant, though slight, leakage of gas grow accustomed to it and cease to notice it. The use of gas for cooking has greatly increased the danger. When a person is constantly exposed to gas-leaks the symptoms seen are anæmia, frontal headache (worse on rising), anorexia, tinnitus aurium, vertigo, bad taste in the mouth, abdominal pains, constipation, indigestion, and lassitude. The patient never feels well, but improves in fresh air. In chronic cases of poisoning the florid complexion caused by carbon monoxid is seldom seen. To examine the blood for carbonyl hemoglobin, the ear is pricked and the blood is drawn into a pipette diluted with from 5 to 10 c.c. of distilled water and examined with the spectroscope. The absorption bands are noted and their position is mapped out with a wave length scale and sodium flame to mark the position of the *D* line. The absorption bands of carbonyl hemoglobin, unlike those of hemoglobin, are not reduced by Stokes's reagent. To detect slight gas in the house Vogel's method may be used. Fresh normal blood is added to distilled water until the latter is faintly tinged. From 3 to 5 c.c. are placed in a flask of a capacity of 100 to 150 c.c. The flask is shaken several minutes in the suspected atmosphere. If carbon monoxid is present, the liquid, it is said, will assume a bright rose tint and give the characteristic spectrum. Yarrow relates two cases showing the importance of recognizing this condition.

Lloyd [2] also reports cases of chronic gas poisoning. Bayles [3] calls attention to the fact that illuminating gas escaping from gas mains may enter the house as an inodorous gas by filtration through the walls. He believes that many cases of illness are due to this cause alone and that it has a marked influence on the death-rates of cities.

Vahlen [4] has studied the question whether illuminating gas and carbon monoxid have similar poisonous actions, by administering to animals the same quantity of the two gases, and has found that illuminating gas has a poisonous action much greater than the amount of carbon monoxid that it contains. It is also an active poison on animals that are only slightly affected by carbon monoxid, namely, frogs.

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[1] Amer. Med., August 30, 1902, p. 338.

[2] N. Y. Med. Jr., August 23, 1902, p. 313.

[3] Ibid., p. 309.

[4] Arch. f. experim. Path. u. Pharm., vol. xlviii, 1902, p. 106.

Iodolin.—This compound of iodol and albumin is offered as a substitute for iodoform. It comes in the stronger and weaker forms for external and internal use. In tertiary syphilis, doses of 30 grains (2 grams), six to seven times daily, may be given internally.

Iodothyrin.—Roos [1] uses iodothyrin to reduce obesity. No change in diet is required. He gives 15 grains (1 gram) or less per day. Anemia improved under small doses.

Iodylin.—Israel [2] reports the result of trials with this drug, which is a bismuth iodo-salicylate. It is used in the form of gauze or powder as a substitute for iodoform. He considers it useful and deserving of further trial.

Iontropar.—This drug is said to increase the formation of the corpuscular elements of the blood.

Ipecacuanha Alkaloids. — Wild [3] believes that in the salts of cephaëlin and emetin we have preparations of considerable importance and of more reliable action than ipecac itself, as the composition of the root is so uncertain. They should be given by the mouth in small and convenient doses for expectoration or emetic purposes. Cephaëlin hydrochlorid was found less suitable for the ordinary uses of ipecacuanha than the emetin salts. The emetic action of cephaëlin is so powerful that it is difficult to regulate the dose so as to avoid causing illness after several days' use. One one-hundredth of a grain (0.00065 gram) every four hours for three days produced nausea and vomiting. He prefers the hydrobromid solution of emetin, as a more suitable and purer preparation than the hydrochlorid, and uses a 1 to 500 solution of this salt.

Jequiritol.—A stable solution of abrin has long been desired, and this is now obtained in jequiritol, and should the effects be too severe from its use, jequiritol serum may be employed locally or even hypodermically.[4]

Lactic Acid.—Stejanovitch [5] reports with Balzer that he employs antiseptic solutions of lactic acid in preference to epilation in the treatment of alopecia areata. The hair is cut short and the scalp washed every day with a mercuric alcoholic solution containing acetic acid. An irritating solution of ammonia, turpentine, and camphorated alcohol is next employed. The hair is brushed with a stiff brush and

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[1] München. med. Wchnschr., September 30, 1902, p. 1607.
[2] Med. Woche, March 31, 1902, p. 139.
[3] Lancet, September 6, 1902, p. 654.
[4] Therap. Monatsh., May, 1902, p. 257.
[5] Bull. gén. de thérap., vol. cxliii, No. 15, 1902, p. 589.

a 50 per cent. aqueous solution of lactic acid employed. Should this solution be too strong, 30 grains (2 grams) to the ounce (30 c.c.) of 90 per cent. alcohol is employed in its place.

Laghnanthes.—J. A. Gardner [1] has been able to separate from the extract substances which appear to be of definite chemical composition. A syrup was obtained which on standing deposited crystals. Laghnanthes consists largely of resinoids, and probably contains alkaloids. The extract is toxic and is not beneficial in tuberculosis, but rather the reverse.

Lead Poisoning.—Seeligmüller [2] reports an acute case of lead poisoning coming on within 24 hours after handling lead plates; and he also reports a case of saturnine encephalopathy, a case due to the use of rouge, snuff, etc. Labbé and Ferrand report that severe lead poisoning [3] has occurred in men working in electric accumulators. The lead, in the form of an oxid, is introduced into the system by means of the respiratory tract.

Lecithin.—Huchard [4] states that lecithin produces favorable action in nutritive changes, notable increase in the elimination of urea, fixation of the phosphates, and increase in weight. It is peculiarly valuable in neurasthenia, in convalescence, in chlorosis, and in anemia. It has proved beneficial in diabetes and tuberculosis. Doses for adults, 2 to 4 grains (0.13 to 0.25 gram) daily, one-half hour after meals.

Light Therapy. — The investigations of light as a therapeutic agent which have been carried on systematically during the past year in Europe, and to some extent in America, bring the conclusion that anything unexpected may in the immediate future be found true of its powers, the diseases in whose cure it has been most tried having hitherto resisted our best efforts.

Valdemar Bie,[5] who wrote the excellent article on the Finsen Institute in volume iii of the eleventh series of the International Clinics, spoke at the Twentieth Congress of International Medicine upon light therapy and light biology. His conclusions were that (1) The chemical rays, especially the violet and ultraviolet may cause sunburn of the skin. (2) The ultra violet rays produce an enlargement in the cutaneous vesicles lasting from five to six minutes. (3 and 4) Light has not been found to influence the quantity of hemoglobin of the blood, nor is it proved that it increases the excretion of carbon dioxid. (5)

[1] Lancet, July 12, 1902, p. 72.
[2] Deutsche med. Wchnschr., vol. xxviii, 1902, p. 317.
[3] Jr. de prac., vol. xvi, No. 3, 1902, p. 45.
[4] Ibid., June 22, 1901, p. 439.
[5] Verhandl. d. Cong. f. innere Med., xx, 1902, p. 134.

Chemical rays of light excite the lower animals and probably men. According to some, red light excites and violet quiets psychic processes. (6) The red rays can penetrate the organism deeply; the blue and violet can only penetrate the tissues when they are bloodless. The ultra violet rays cannot go further than the superficial layers of the skin. (7) The same is true of the power of light to kill bacteria in the organism, it having no curative effect on superficial affections. The speaker then gave a review of the therapeutic use of light. (1) Finsen's treatment of smallpox with red light, by which the formation of pus in the vesicles, and also, consequently, fever and pitting are prevented. (2) In other exanthematous diseases, Bachmann and Chatiriére have obtained favorable results in measles, and Crookenburg in erysipelas, with the red rays. (3) The incandescent sweat baths of Kellogg are nothing but sweat baths and have no specific effects, but they are the most complete of all sweat baths. (4) The local illumination of incandescent or arc lamps have no claim on our attention. (5) The general light therapy of the future will be sun baths without subsequent packing; or electric arc light baths of 150 to 200 ampères with sweating. (6) The only local application whose efficiency has been proved is Finsen's treatment of skin diseases with concentrated chemical light rays. Nothing is destroyed; there is no shrinking; the scars are white and smooth; the treatment is painless. In 640 patients the treatment had to be stopped in only 1.7 per cent. About 85 per cent. showed absolutely favorable results. Only in the case of 15 per cent. was the improvement less favorable. In lupus erythematoides the results were uncertain. In alopecia areata, nævus vascularis, acne vulgaris, acne rosacea, and cutaneous epithelioma, favorable results were obtained, but not as good as in lupus vulgaris.

Kime[1] reports that laryngeal tuberculosis has yielded most readily to actinic sunlight. After a few applications pain disappears and aphonia diminishes. Of 60 cases of pulmonary tuberculosis the disease was arrested in 7 and in 11 practically cured. An intense blue light rich in actinic rays is focussed upon the bare chest of the patient two or three hours daily; there is increased dyspnea for a few days. Blue light has been extensively experimented with. Von Jaksch,[2] of Prague, recommends it as quieting and soporific. Cobalt blue glass chimneys are frequently of value in the sick room. Kluckenberg has treated 18 cases of erysipelas with red light. In 7 the fever stopped within a day; in 4, within two days; in 3, within two and one-half days.

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[1] Med. Rec., November 1, 1902, p. 681.

[2] Verhandl. d. Cong. f. innere Med., xx, 1902, p. 155.

Charcot in 1859 showed that sunburn was not dependent upon the heat rays, but upon the chemical rays of sunlight. Widmarks has produced sunburn by electrical light. Finsen has shown that under the influence of light there is a marked dilatation of the blood vessels, which lasts an extraordinary length of time after exposure, and his assistant, Bang, has demonstrated a marked leukocytosis accompanying this dilatation.

In the higher animals light increases the amount of carbon dioxid given off, and strong light is fatal to many bacteria. The bactericidal power belongs to the violet end of the spectrum and is shared to some extent by artificial light. By concentrated electric light Finsen has killed bacteria in five to eight minutes. The Finsen method is stated by McLeod to be bactericidal, while the X-rays are not, and the latter produces a more severe dermatitis.

Danlos [1] finds that results from the use of radium in weak activity have been favorable, but patients often relapsed. With a stronger action cures have been more satisfactory. Two methods are used: the dry method with short sittings and the ulcerating method of prolonged application. Hallopeau's case showed an ulceration with cure after an application of the placque of 19,000 activity for 120 hours. The rays of radium appear to be a combination of cathode and X-rays.

Mesotan.—Floret [2] recommends mesotan, a new salicylic acid compound, for the local treatment of rheumatism in place of the oil of gaultheria. It is said to be odorless, easily absorbed, and is used mixed with equal parts of olive oil as a liniment three times daily.

Methyl Alcohol.—An investigation of the city chemist of New Orleans has shown that a popular internal antiseptic contains 30 per cent. of methyl alcohol, thus accounting for the large number of cases of partial or total blindness applying for treatment at the Eye, Ear, Nose, and Throat Hospital of that city.

Methylene Blue as a Sedative.—Hughes and Lovelace [3] report 22 cases of insanity in which this drug was used as a sedative. In nearly all the cases there was wild excitement, and in 6 only did it fail to produce a calming effect, which seemed a natural quietude rather than the action of a drug, there being no somnolence or hebetude. The effect was noticed in from 3 to 4 hours and lasted 15 to 20 hours. The drug was administered hypodermically in aqueous solution in 1 grain (0.06 gram) doses; in others it was given in capsules. It is necessary to boil the solution in order to prevent the formation of abscesses.

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[1] Annales de dermatologie et syphiligraphie, July, 1902, p. 723.

[2] Deutsche med. Wchnschr., No. 42, 1902, p. 765.

[3] Phila. Med. Jr., March 2, 1902, p. 532.

Milk.—Reinach advises that milk be replaced by chocolate in certain cases of dyspepsia, scrofula, and rachitis in infants from six to nine months old. It is said to be well digested in these cases. The cause of the turning of milk or meat during electric disturbances is either from some chemical convulsion or from a stimulus given to bacteriologic agencies set up by an opposite electric condition induced by the disturbed state of the atmosphere. These changes may be going on all the time, though not to the same extent when no electric disturbance exists. The electroscope shows that a conducting point elevated in the air is taking up positive electricity, the tension rising with the height of the point, this effect increasing about daylight, reaching its maximum some hours after sunrise, and diminishing some hours before sunset, when it again rises to a second maximum some hours after sunset. These changes are much more rapid and marked during a thunder storm. The oppression experienced by many as a thunder storm comes on has a similar foundation.[1]

In a paper on asses' milk Ellenberger, Seeliger, and Klimmer[2] find that it approaches very nearly in its albuminous bodies, both in composition and amount, to human milk. The fat is different from that found in both human and cow's milk and is small in amount. The amount of lactose is intermediate between woman's and cow's milk, while the salts more nearly approach human milk. In the artificial digestion of asses' milk but a small amount of its difficultly digestible parneuclin remains behind.

Buttermilk has long been used in raising infants in Holland. Salge finds the composition of fresh buttermilk to be 2.5 per cent. proteids, 0.5 to 1 per cent., and 3 to 3.5 per cent. sugar. It is inexpensive, but it must be absolutely fresh, and may be mixed with rice or wheat starch.

Arthur V. Meigs, in an interesting paper read before the College of Physicians, Philadelphia, May 7, 1902, defends two propositions which he considers as vitally important in infant feeding: (1) that human milk never contains more than 1 per cent. of casein, and (2) that the food of infants should not be made stronger from month to month, but only increased in quantity. He also attacked the analyses of the various observers who while agreeing that human milk gave in casein and sugar about 8 per cent., varied in their separate estimates of casein and sugar, in most instances placing the casein far too high.

Mineral Waters.—Crook[3] shows by tables that in every class save

[1] Lancet, July 5, 1902, p. 35.

[2] Arch. f. wissensch. u. prakt. Thierh., vol. xxviii, Nos. 3 and 4, 1902.

[3] Med. Rec., June 28, 1902, p. 1036.

sulphated salines the waters of our own country are richer in mineral ingredients than those of Europe.

Myelocen.—Watson and Thompson [1] report the results obtained in treating psoriasis with myelocen, a preparation of bone marrow. Cures occurred in cases existing from 3 to 10 years, relief occurring in one case after the first application. A case of three years' duration of psoriasis of the scalp recovered in 10 days.

Pankreon.—Hemmeter [2] describes this latest addition to the ferments as a gray, odorless powder of a by no means unpleasant taste. At the temperature of 40° C., 1 gram digests 83 per cent. of 100 grams of albumen in 15 minutes. Its advantage is in its resistance to the hydrochloric acid of the gastric juice. It is useful in achylia gastrica, chronic atrophic gastritis, and intestinal atrophy.

Perdynamin.—Kronheim [3] and Liebreich [4] find perdynamin entirely digestible, well tolerated, and useful in increasing the hemoglobin.

Picric Acid.—H. de Brun [5] employs picric acid, 1 to 100 or 1 to 200, in the treatment of blennorrhagia.

Podophyllin.—De Rocca-Serra [6] calls attention to a form of iritis due to the introduction of podophyllin into the eyes of those working with this drug. The eyes are markedly affected, but the prognosis is good under the use of hot compresses, bandages, and atropin.

Potassium Bicarbonate. — Denstedt and Rumpf [7] base the *rationalé* of their treatment of pernicious anemia by this drug on the fact that the percentage of potassium in the liver in a case of grave anemia was above the average, while in other organs it was lower, the blood showing a high percentage of water and sodium chlorid with a low percentage of solids, and an extreme reduction of potassium and iron. The liver and spleen both contained from four to five times more iron than the normal. This great reduction in the percentage of potassium can best be explained by the destruction of red corpuscles alone; but it is also possible that the potassium contained in the red corpuscles is absorbed by some toxic substance which thus brings about the death of the corpuscle. This led them to employ organic salts of potassium in the treatment of pernicious anemia. Rumpf reports four cases; one patient was cured and remained well for three years; two

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[1] Lancet, October 18, 1902, p. 1033.
[2] Med. News, June 7, 1902, p. 1075.
[3] Deutsche med. Wchnschr., July 3, 1902, p. 495.
[4] Therap. Monatsh., August, 1902, p. 423.
[5] Montréal Médical, September, 1901, p. 244.
[6] La Semaine méd., February 12, 1902, p. 50.
[7] Therap. Monatsh., vol. xv, No. 5, May, 1901, p. 257.

others were improved; and the fourth is under treatment. In the successful case the hemoglobin was reduced to 20 per cent. and the blood count showed 1,200,000 red cells with limited poikilocytes and nucleated red cells. After the use of a one per cent. solution of bicarbonate a marked improvement was noted. At the end of five weeks, during which potassium salts were administered internally, the hemoglobin had risen to 40 per cent. and the number of red corpuscles to 3,290,000. It is suggested that pernicious anemia may in some cases represent an acute disease the cause of which is only temporary, and after its subsidence the blood is deficient in one of the organic salts of potassium.

Potato Diet.—Mossé,[1] of Toulouse, holds that the potato is not only beneficial but actually constitutes an essential element in the treatment of diabetes. By giving it in place of the ordinary ration of bread, he finds that sugar diminishes under this diet. The results are best in that form of diabetes which is marked by thinness. The patient gets six times as much water and three times as much potassium salts in taking the potato as in taking bread, potassium being the integral part of the alkaline treatment of diabetes.

Purgatin. — Marshall[2] describes purgatin as a yellowish-brown powder, insoluble in cold (and sparingly soluble in hot) water, alcohol, and ether. The urine is reddened by purgatin showing its elimination through the kidneys. As there is no taste, it is easy to administer the drug to children. It is a mild laxative, in doses of 10 to 30 grains (0.6 to 2 grams), slow but certain, not causing much pain, but no better than the ordinary drugs in habitual constipation.

Pyrogallol, Poisoning by.—Rusch[3] reports a case in which a 10 per cent. pyrogallol ointment used in the treatment of psoriasis in a pregnant woman was attended with marked toxic effects and death of a seven months' fetus.

Rest, Physiologic.—A. E. Maylard[4] advocates physiologic rest in certain diseases of the alimentary canal. In regard to the stomach his conclusions are: (1) In all cases manifesting any unduly prolonged vagueness in the symptoms and in which no permanent good is obtained by ordinary remedial measures. (2) In tractable cases of hyperchlorhydria. (3) In all cases of gastric ulcer. (4) In almost all cases of chronic gastric catarrh. (5) In all inexplicable cases of

[1] Jr. des Praticiens, vol. xvi, No. 10, 1902, p. 156.
[2] Scot. Med. Sur. Jour., May, 1902, p. 402.
[3] Wien. klin. Wchnschr., December 26, 1901, p. 1296.
[4] Lancet, October 25, 1902, p. 1144.

gastric dilatation. (6) In cases of pyloric obstruction, and (7) in cases of recurrent gastric hemorrhage from whatever cause. In all these he considers that a gastrojejunostomy should be performed. As to the remainder of the alimentary tract, his conclusions are as follows: (1) The esophagus is given rest by the performance of gastrojejunostomy. The gastric fistula is one that will close at any time when it is deemed advisable. (2) The stomach is given rest by the performance of gastrojejunostomy, the fistula subsequently contracting or remaining freely open according to the patency of the pyloric orifice. (3) The colon is given rest by the temporary formation of an artificial anus in the right iliac or lumbar region. (4) The rectum is given rest by the establishment of an artificial anus in the left iliac. Maylard recites the cases reported by Schlatter to show that the possession of the stomach is not vital to the carrying on of the general economy. It cannot be doubted that under dietetic medicinal treatment at least some cases of gastric ulcer readily recover.

Niedner[1] reports excellent results in hemoptysis from complete strapping of the affected side, thus fixing the chest as completely as possible and giving complete rest to the affected lung.

Rheumatin.—This compound, containing quinin and salicylic acid, is given in doses amounting in the day to 50 to 60 grains (3 to 4 grams). Pieper[2] has used it successfully in articular rheumatism.

Salochinin.—Coile finds this tasteless drug useful in those cases where quinin and salicylic acid are employed, as it is a salicylic acid ester of quinin.

Salol.—Tuthill[3] has had good results from doses of 10 grains (0.6 gram) of salol every two hours in the first stage of pneumonia.

Santonin.—Negro[4] has employed santonin in 11 patients suffering from locomotor ataxia. In 8 cases there was improvement; in 2, the bettering of the symptoms were only temporary; in 1, there was no result noted. Ten grains (0.6 gram) were administered as an initial dose, and 5 grains (0.3 gram) were given 5 hours later. It was employed only during the period of crisis. The pain was eliminated two or three hours after the first dose and disappeared after the 15 grains (1 gram) had been taken. The dose is larger than that ordinarily recommended and 15 grains (1 gram) in certain instances has produced well-marked toxic symptoms.

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[1] Deutsche med. Wchnschr., June 5, 1902, p. 407.

[2] Therap. d. Gegenwart, May, 1902, p. 239.

[3] Med. Rec., May 17, 1902, p. 766.

[4] Bull. gén. de thérap., vol. cxlii, No. 18, 1902, p. 717; abstracted from Giornale d. Reale Acad. d. Med. di Torino, vol. xvii, 1901, p. 47.

Wagner [1] mentions a remarkable case in which a child who had been given santonin, evacuated and vomited a large number of organisms, many of which were found after death in the entrance to the esophagus causing dyspnea, which did not prove fatal until two hours had elapsed.

Septoforma.—A disinfectant produced by condensation of formaldehyd with bodies belonging to the terpen, naphthalin, and phenol groups.

Serum.—Trunecek's serum [2] acts upon bleeding tissues in arteriosclerosis by diminishing the blood pressure and changing the composition of the blood, the latter especially in chronic rheumatism in which the serum causes immediate improvement. Neurasthenia and hysteria often accompany arteriosclerosis, yet both combinations improve under this serum treatment. It may also be indicated in epilepsy, uremia, paralysis agitans, diabetes, and in reducing local congestion.

Sidonal.—Huber and Lichtenstein [3] have noted excellent results in treating gout with quinic acid given as sidonal. The excretion of uric acid is increased in gouty persons, and the sugar is diminished in diabetes. Bardet [4] has also obtained good results from the administration in powders of from 25 to 75 grains (1.6 to 5 grams) of sidonal in the treatment of gout or gouty rheumatism. The remedy was continued for a month after the painful phenomena had disappeared. In three cases, however, the quantity of uric acid excreted was diminished from the beginning.

Silver Vitellin.—Christian [5] has been conducting investigations regarding this new silver compound in gonorrhea. It is absolutely free from any irritating properties. The gonococci underneath the mucous membrane are rapidly destroyed and the amount of discharge is at once lessened in a marked degree. In his series of cases one-half were cured in two to four weeks.

Specific Medication.—Andrew F. Smith [6] believes that the prospect is favorable for the discovery of an increased number of specifics. Pneumonia he considers a promising field because the microorganism is not hearty. Sodium salicylate has accomplished most. He has found creosote carbonate nearly as efficient. It may be used when sweating makes the salicylate objectionable. The value of large doses

[1] Deutsche med. Wchnschr., vol. xxviii, No. 49, December 4, 1902, p. 886.
[2] Presse méd., January 18, 1902, No. 6, p. 63.
[3] Berl. klin. Wchnschr., July 14, 1902, p. 653.
[4] Bull. gén. de thérap., April 15, 1901, p. 518.
[5] Med. Rec., September 27, 1902, p. 494.
[6] Ibid., March 5, 1902, p. 401.

of carbolic acid in influenza and scarlet fever he discusses favorably. It can be pushed far beyond the point of carboluria in safety, and he suggests the use of mercuric chlorid, internally as well as locally, in urethritis.

Spermin.—G. Von Hirsch [1] has written an article on the therapeutic applications of spermin. It is given in the form of essentia, of which 20 drops are taken three times a day, in the treatment of anemia, tabes, endarteritis obliterans, and irregular heart action.

Styplician. — Kauffmann [2] finds styplician an especially useful antiphlogistic in furunculosis. It is used in a 4 to 5 per cent. salve.

Sublamin.—This disinfectant, along with alcohol, is employed by Fürbringer,[3] Blumberg,[4] and others as a disinfectant for the hands.

Sucramin.—Sucramin is a new sweetening agent, 700 times more sweet than beet sugar. Except in its solubility it resembles saccharin.

Tachiol.—Tachiol [5] was brought to the notice of the profession by Professor Durante, January 26, 1902. The experiments have been more fully carried on by G. Perez, his assistant.[6] It is a fluorid of silver, and when pure appears as colorless transparent crystals, rapidly changing by exposure to a yellowish color and finally to a black horny mass; extremely soluble in water and very stable when not too concentrated. Solutions were made of the strength of 1 to 1000 and 1 to 100. The solution is non-irritating to the skin, does not injure instruments, but blackens linen. Perez found that both in arresting the development of germs and in killing them the fluorid of silver is greatly superior to carbolic acid and only slightly inferior to corrosive sublimate of the same strength, and in this respect is the most potent of all silver salts. It penetrates more deeply since it coagulates albumin less than corrosive sublimate or nitrate of silver, and the bacilli in the blood proved less resistant to this solution than to those of nitrate of silver and corrosive sublimate, the presence of chlorid of sodium not affecting it. It is but feebly toxic. Perez used it extensively in surgical practice in sinuses, cavities, tuberculous lesions, and in cases of cystitis, proctitis, endometritis, and urethritis, in solutions of 1 to 1000 and 1 to 5000. It has also been used by Carapelle and Benedetti in ophthalmic practice with highly encouraging results.

Tannoform.[7]—This remedy is used in hyperidropedesis, or severe

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[1] Lancet, February 1, 1902, p. 327.
[2] Monatsh. f. Prakt. Dermat., vol. xxxv, No. 3, 1902, p. 97.
[3] Deutsche med. Wchnschr., vol. xxviii, No. 37, 1902, p. 664.
[4] München. med. Wchnschr., September 16, 1902, p. 1534.
[5] Lancet, February 8, 1902, p. 393, and December 20, 1902, p. 1707.
[6] Il Policlinico, Sezione Chirurg, No. 10, 1902.
[7] Merck's Archives, April, 1902, p. 164.

sweating of the feet, by Grumme. The powder was dusted freely in the stocking after washing the feet thoroughly, and worn for 24 hours. The skin in contact with the powder became brown and ceased to perspire. After three or four weeks sweating recommenced, necessitating a new application. Diluted with talc the result is less marked and less permanent. From ointments and alkaline solutions blistering result.

THEOCIN.—This synthetically produced tea alkaloid is a powerful diuretic and is administered in doses of 3 to 6 grains (0.2 to 0.4 grams), three or four times daily.

THIGENOL.—Thigenol is an organic compound containing 10 per cent. of sulphur, and is used in gonorrhea, scabies, eczema, etc.

THIOCOL.—Caracciola [1] says after two years' experience with this creosol preparation that he believes that there is no remedy which can rival thiocol in diseases of the bronchial tubes and of the lungs, and that it acts as a prophylactic against tuberculosis. Drago and Motta Coco [2] use thiocol in the form of a syrup (sirolin). These authors have performed animal experimentation with the drug and favorably report 12 cases of pulmonary diseases, mostly tuberculous, treated with it. The drug would seem to possess no special value over creosote.

THYMOL URETHAN.—Thymol urethan [3] is a compound of the thymol and thymol carbonic ester. It is readily broken up in alkaline intestinal juice into thymol which acts as an anthelmintic.

TOBACCO.—See "TOBACCO AND ALCOHOL."

TROPACOCAIN.—Neugebauer [4] uses tropacocain as an anesthetic for the spinal method. Five one-hundredths of a grain causes anesthesia in a few minutes, which gradually extends to the legs. His longest operation lasted one and a quarter hours. He considers freshly boiled tropacocain solution safe for operations on the lower extremities, but its effect upon the upper parts of the body is uncertain.

TROPON.—Kraus [5] has used tropon in 24 patients varying in age from 6 months to 15 years, and considers it an excellent food. He uses daily quantities of from 1 to 2 grams. Children like it; it aids digestion; and the doses may be increased; creates an appetite; adds weight; is good in convalescence with anorexia; and is cheap.

VALIDOL.—Georg Schwersenski [6] gives a report on validol, a com-

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[1] Merck's Archives, September, 1902.
[2] Klin. therap. Wchnschr., Nos. 31 and 32, 1902, pp. 1018, 1055.
[3] Union Pharm., xvii, xliii, p. 269.
[4] Wien. klin. Wchnschr., December 26, 1901, p. 1299.
[5] Allg. Wien. med. Ztg., February 25, 1902, p. 91.
[6] Therap. Monatsh., vol. xv, Nos. 5 and 6, 1901, pp. 250 and 304.

bination of menthol and valerianic acid, first introduced by him in 1897. He refers to the irritating qualities of menthol, which, having been removed by the introduction of validol, containing as it does 30 per cent. of free menthol, permit of its employment externally. The dose is from 5 to 10 drops three times a day; and for local use 10 to 15 per cent. in ointments. Its use is the same as menthol, in gastralgia and cardialgia. It reduces sensitiveness in acute coryza, in headaches, and in neurasthenia; it is used as a prophylactic against seasickness, and the nausea following intoxication, in controlling nervousness and vomiting, and it is successfully applied locally in certain forms of eczema and skin diseases associated with itching, and in pruritus; applied to the precordia it controls the pain of angina pectoris. Validolum camphoratum, he also claims, is a valuable spasmodic and cardiac excitant. This is a 10 per cent. solution of camphor in validol.

X-Ray Therapy.—The consensus of opinion concerning X-rays is still tentative and expectant. The success gained in lupus, the notable power for evil when carelessly used, and the reported successes in various other conditions, especially epithelioma and favus, have all led the investigator on to further trial. For diagnostic purposes their use is extending. Benedikt [1] has been able to demonstrate a tumor at the base of the brain by this method, having taken profile skiagraphs of both sides. Grubbe [2] says that the greatest value of the X-ray is to be obtained in treating post-operative cases of malignant disease to prevent recurrence. Often in hopeless inoperable cases it prolongs life, makes the patient comfortable, and frees the last hours from pain. Retrogressive changes are noticed in all primary cancers or tuberculous growths.

From many cases that have been reported cured or relieved a few may be selected. Socoloff [3] has had remarkable success in the treatment of herpes tonsurans and favus, six cases having yielded four complete cures; the exposures varied from 70 to 230 minutes in the aggregate. Pugh [4] reports four cases of rodent ulcer successfully treated by X-rays. He advises that the sittings shall not exceed 15 minutes. Rumpf has seen erysipelas scattered and occasional good results in neuralgia. Hair has been stimulated to growth.[5] The apparatus of D'Arson-

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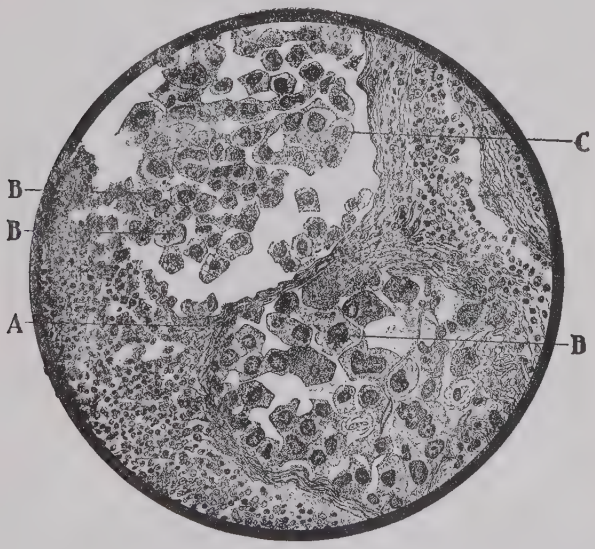
[1] Deutsche med. Wchnschr., June 5, 1902, p. 405.
[2] Med. Rec., November 1, 1902, p. 692.
[3] Bolintschriai Gazetta Botkina, January 23, 1902.
[4] Brit. Med. Jr., April 12, 1902, p. 882.
[5] Ibid., October 25, 1902, p. 1320.

val is useful in the treatment of pruritus, pityriasis versicolor, and in abnormal pigmentary deposits.

A. G. Ellis [1] reports four cases, in three of which microscopical studies were made both before and after exposure to the X-ray. The most interesting changes were noted in a scirrhous carcinoma of the breast, a portion of which had been given eight ten-minute exposures at intervals of two days, the remainder being covered by a lead shield. Softening of the exposed portion was noted after the fifth exposure. The entire breast was removed by operation and two portions studied (Figs. 17 and 18). The softening was found to be due to a cavity

FIG. 17.



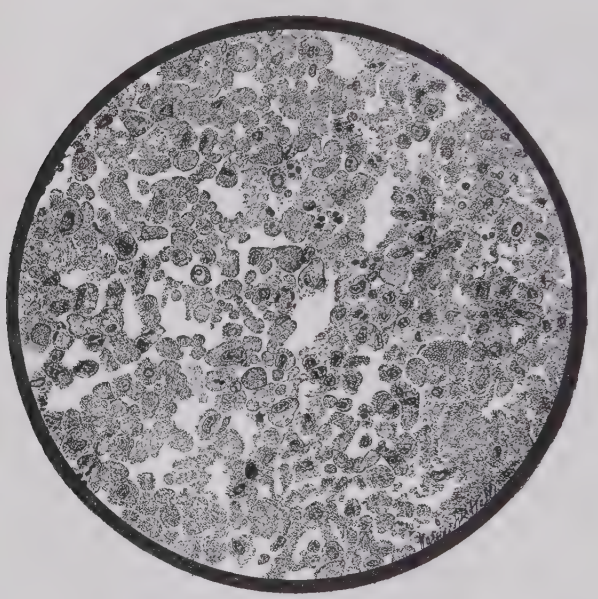
Scirrhous carcinoma of mamma. Section from unexposed area. *A*, scanty stroma separating two alveoli. In the upper right and lower left parts of the field the extensive lymphoid and plasma cell infiltration of the stroma is well shown. *B*, *B*, *B*, cells showing atypical mitoses. *C*, cells showing fusion of the protoplasm formation of the so-called giant cells of cancer.

0.5 by 1.5 cm. in dimensions, this containing a fluid showing many large cells the protoplasm of which was almost entirely filled by fat granules. Surrounding the cavity were necrotic portions of the tumor, the epithelial cells being granular and broken with destroyed outline and fragmented or entirely degenerated nuclei. The same degeneration, in varying degrees, was noted in the other cases, two squamous epitheliomas and an endothelioma. But little change was noted in one of the epitheliomas which contained a very large number of "pearls." A

[1] Am. Jr. of Med. Sci., January, 1903, p. 85.

summary of the cases showed: (1) Necrosis of cells and trabeculæ of varying degree; (2) increase of elastic tissue in the three cases examined both before and after exposure; (3) a tendency to occlusion of vessels by deposits on their inner surfaces, which was marked in

Fig. 18.



Scirrhous carcinoma. Section from exposed area. Field includes the contents of a large alveolus. Plasmatolysis and chromatolysis, which in parts of the section have terminated in the formation of a finely granular acidophilic detritus, are present throughout the field.

some instances, slight in others; (4) practically entire absence of infiltration by polymorphonuclear leukocytes. In regard to the claim of Beck and others that the changes in the X-rayed tissue are due to obliterative changes in blood vessels, the statement was made that while these changes probably occur they are not in proportion to the necrosis. This suggests the probability of their being results of the same influence instead of cause and effect. The presence of immense numbers of cocci and bacilli in one of the cases after twenty exposures would argue against the bactericidal power of the X-ray. Unsatisfactory clinical results and slight microscopic changes in the epithelioma containing numerous "pearls" emphasize the importance of cutting or curetting away diseased tissue whenever possible before X-ray treatment is begun.

Codman [1] claims that the frequency of X-ray burns has been much

[1] Phila. Med. Jr., March 15, 1902, p. 499.

exaggerated. He has collected less than two hundred cases, one-half of which were serious and one-third of which occurred in X-ray workers themselves. He estimates less than one patient per thousand injured in the past five years, and in the last year only one in ten thousand. The static machine is least likely to produce injury; no burn has occurred with an exposure equivalent to or less than five minutes at ten inches. In two cases no symptoms appeared for five months. He suggests a standard exposure of one minute at six inches from the platinum terminal. On the other hand, two suits for damages caused by the use of X-rays have been entered in New York. One is to recover fifty thousand dollars for damages for a burn. The other case is that of a woman who claims that the left side of her face was severely burned and permanently scarred, that she lost all her hair, and that her nervous system is completely wrecked by an attempt to diagnose an affection of the left jaw bone by means of X-rays.

SURGERY

The progress of surgery in 1902 has been even more daring than in previous years. While old operations have been perfected, more attention has been paid to new methods of diagnosis, as in appendicitis, in which the question of leukocytosis has been carefully studied. The technic of brain operations has made progress as rapidly as our increased knowledge of cerebral localization has warranted, and the X-rays have still further assisted surgery, as may be seen in many communications on the greatest variety of different subjects. The most daring operations are being advocated on the heart, as the suturing of the heart muscles after injury, direct massage in narcosis, and even the suggestion of stretching a button-hole mitral valve. Roughton [1] has called attention to the increase of dental disease, while many dentists during the year have written on the prophylaxis of the mouth, D. D. Smith advocating that the teeth of all children should be cleansed at least once a month by the dentist. Lund [2] has directed notice to the surgical importance of the iliopsoas bursa (Fig. 19), and Pye-Smith [3] describes a testicular cyst containing acari of a variety hitherto unde-

[1] Lancet, vol. ii, 1902, pp. 847, 1029, and 1108.
[2] Boston Med. and Surg. Jr., September 25, 1902, p. 345.
[3] Quart. Med. Jr., August, 1902, p. 322.

scribed. The suggestion is made that the mite was introduced by a catheter.

Appendicitis.—The operation for appendicitis is that about which one still hears the most. Whatever view one may take in regard to the causation of appendicitis, whether it is now for some unknown reason more frequent than it has been in the past, or whether it is now recognized when before it was confused with other conditions, the disease is now certainly well known and has become a cause of constant dread to the lay public; indeed, so much so that the question whether the appendix should or should not be removed from all persons as a precaution is sometimes seriously raised. The proposition has also been debated whether the appendix should be removed whenever the abdomen has to be opened for other reasons. Howard A. Kelly [1] has undertaken to secure a consensus of opinion by addressing a series of questions to 80 well-known surgeons of the United States. The opinion of 44 to 26 was against the removal of the healthy appendix, while 60 to 7 were in favor of removing it when even slightly adherent to other structures. Kelly himself believes that the appendix should always be carefully examined whenever the abdominal cavity is opened, provided no additional risk is incurred by so doing. Even fecal concretions in an otherwise healthy organ warrant its removal, and a long and free appendix should always be amputated. After the removal of the right ovary the stump should always be covered with peritoneum in order to prevent the risk of adhesion to the appendix.

We still know very little concerning the etiology of appendicitis. Many theories have been advanced, but have been abandoned. Concretions, seeds, psychic conditions, arthritic diathesis, constipation, gymnastics, tight belts, and hereditary specific diseases have been each in turn suspected of being an agent in its causation. Foreign bodies may set up irritation in the appendix, but they are of rare occurrence. Perhaps the most plausible cause for its increased frequency during the past twelve years has been the simultaneous prevalence of influenza. Metchnikoff's recent theory [2] is that intestinal parasites form a most frequent factor by injuring the walls of the appendix and establishing a point of least resistance to the assaults of pathogenic organisms. The appendix being a rudimentary organ, its resistance is but slight. Many writers have more recently written on the same subject, and report the finding of *Ascarides, Trichocephalus dispar,* and *Oxyurides,* either in the diseased appendix or in the intestinal

[1] Jr. Am. Med. Asso., October 5, 1902, p. 1019.
[2] Bull. de l'acad. de méd., March 12, 1901.

tract. Von Motier [1] states that in three out of five cases of appendicitis occurring in his own practice he found oxyurides either in the appendix or in the intestine. They occurred so frequently as hardly to be regarded as accidental. He draws the conclusion that they play an active part in the production of the disease. Ascarides seem to be associated with gangrenous inflammation, while the trichocephalus or oxyuris leads to chronic appendicitis. He has found 30 to 60 grains of bismuth subnitrate taken in small quantities at intervals in the course of the day of great use in relieving the cramps accompanying the disease. Bégouin [2] has also published a paper on thread worms and appendicitis which is of especial interest. A woman, aged 24 years, was admitted to the hospital with a diagnosis of recurrent appendicitis. The attacks, lasting three or four days, had been recurrent for four or five years. Once or twice there was some swelling of the iliac fossa. On examination there was found a slight tender swelling the size of an almond below McBurney's point. On operation sclerocystic ovaritis was found and the ovary removed. The vermiform appendix was free from adhesions, but being somewhat swollen was also removed. It contained fifteen thread worms, some of which were united so as to form a plug. There were also four small ulcers.

Spellissy [3] reports 194 cases with lesions of 20 varieties of structure and 68 species of lesion, not one of them being of appendiceal or gynecologic origin, yet all mistaken for appendicitis. Of these 30 were lesions associated with the gall bladder. He asks the question, "Is the diagnosis of appendicitis difficult?" Most writers say, "No," but a diagnosis in cases with symptoms pointing to the right iliac fossa should not be made without a routine conscientious examination. Harte and Willson [4] report a case of early carcinoma limited to the vermiform appendix, and refer to the few previously reported cases.

Miller [5] thinks that in dulness we have a means of distinguishing operative and non-operative cases. In 41 cases dulness was found in 24; of these pus was diagnosed in 17 and found operatively in 14, *post mortem* in 2, and in 1 by the escape of pus through the bowels. In 2 patients with pain, but no dulness, only an adherent appendix was found. In one case with marked dulness operation showed tuberculosis of cecum and appendix. Seventeen patients showing all the classic symptoms except dulness made good recoveries without operation.

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[1] Echo méd. du Nord, 1902; abstracted in Lancet, November 1, 1902, p. 1211.

[2] Gaz. hebd. des sc. méd. de Bordeaux, July 27, 1902.

[3] Annals of Surgery, June, 1902, p. 758.

[4] Med. News, August 2, 1902, p. 193.

[5] Med. Rec., October 18, 1902, p. 613.

Treves [1] points out that the symptoms of appendicitis are due to involvement of the peritoneal covering of that organ and that extensive ulceration of the mucous membrane may exist without this symptom. He considers that life in a tropical country has little effect in encouraging appendicitis in Europeans, and believes that the most common factor in the etiology of an attack is a loaded cecum. The right-sided tender spot which can be made out in so large a proportion of healthy individuals is the iliocecal valve. He found it in 24 out of 27 healthy medical students. The obliquely placed, round, corded structure which is felt in palpating the right iliac fossa is the contraction of the muscle fibers of the abdominal wall. A large proportion of cases recover spontaneously, the mortality not being over 5 per cent. Operations during an acute attack have a mortality of over 20 per cent. Because of danger of relapse in the ultra acute cases, immediate operation is demanded, and when suppuration has occurred; in all other cases the question of operation may be delayed for the first few days of the attack and usually can be left open until the fifth day or later.

Weir [2] suggests that use may be made of the useless appendix in the treatment of obstinate colitis. He utilized the appendix to make a fistula in a case of colitis by means of which the lower bowel might be irrigated. A No. 12 English catheter was introduced without difficulty.

Suturing of Heart Wounds. — Thirty-four cases of suturing wounds of the heart are reported in the *Lancet,* July 26, 1902, p. 232, 26 of which were tabulated by Vaughan in reporting his own cases. In 1896, 3 operations were performed; 2, in 1897; 4, in 1898; 11, in 1899; 3, in 1900; and 9, in 1901. In the first half of this year 2 operations have already been reported.

From the suturing of heart wounds to circulatory interference in valvular disease is but a step. Lauder Brunton [3] has experimented upon operative interference for mitral stenosis in cats, opening the left ventricle in diastole. As a number of animals recovered, he believes incision of the mitral valve will soon be possible in the treatment of human beings with mitral stenosis. He says on looking at the contracted mitral orifice in a severe case of this disease, one is impressed by the hopelessness of ever finding a remedy which will enable the auricle to drive the blood in a sufficient stream through the

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[1] Brit. Med. Jr., June 28, 1902, p. 1589.
[2] Med. Rec., August 9, 1902, p. 201.
[3] Lancet, February 8, 1902, p. 352.

FIG. 19.—The iliopsoas bursa frequently extends above the pelvic bone and is often in direct connection with the hip-joint, which may be drained by opening the bursa, often with great relief to the osteo-arthritic conditions present. The bursa is best reached by a vertical incision just below Poupart's ligament, between the anterior crural nerve and the femoral artery. *A*, Poupart's ligament; *B*, anterior crural nerve; *C*, bursa opened through the fibres of the iliopsoas and retracted by threads; *D*, femoral artery; *E*, femoral vein; *F*, sartorius muscle. The dotted line represents the limits of the bursa in one of the cases reported.

FIG. 20.—Limiting the dog in bone-grafting.

small mitral orifice, and the wish unconsciously arises that one could divide the constriction as easily during life as one can after death. He advises exposing the heart by incisions from the left edge of the sternum outward to the left lung. The edges of the third and fifth ribs connecting the outer ends by a third incision and dividing both the soft structure and the fourth and fifth rib. The incised tissue is then forcibly turned back on the sternum, the heart is exposed and the pericardium divided. A knife like a tenotome-knife is advised for division of the valves, with a cutting edge of about one-half inch. The first question is whether the mitral orifice should be enlarged by elongating the natural opening, or whether the valves should be cut through their middle at right angles to the normal opening. He considers the former the better plan. He has not yet decided whether it would be best to operate from the auricle or from the ventricle. It very rarely gives rise to any bleeding, as the knife need not be much thicker than a needle. Many times he was astonished at the way the heart went on beating apparently unaffected by the pulling, pressing, or handling. The knife should be introduced during diastole, and the pericardium drained of blood.

BONE-GRAFTING.—A. W. Morton [1] reports a case showing the advantage of transplanting by vascular attachment bone from a dog to repair bone defects in man. In a case of tibial necrosis the patient was placed under medullary narcosis, the periosteum resected back, and the end of the bone freshened, so there was free hemorrhage. A black-and-tan dog of medium size had been prepared by trimming the hair and bathing and shaving the fore legs. The dog was placed under ether and the left fore leg cleansed thoroughly and amputated just above the tarsus; the ulna was left 1 inch longer than the radius; the skin and muscles were divided by a longitudinal incision for about 4 inches and left attached, except about 3 inches at lowest end, which was removed to the periosteum; the cut ends of the ulna entered the cavity of the tibia 1 inch and were united with silver wire to same; the fibula was wired to the end of the tibia. The upper part of the incision in the patient's leg was closed by stitches; this placed the dog's leg on nearly the same plane as the man's leg; the wounds were drained, as they were not aseptic; all the stronger tendons in each leg of the dog were severed by a subcutaneous incision; the wounds were dressed with gauze, and the other 3 legs of the dog were encased in plaster of Paris separately; the dog and the leg of the man were encased in a plaster cast, extending to the knee of the patient (Fig. 20). A space was left

[1] Amer. Med., July 12, 1902, p. 55.

beneath the dog to prevent soiling from the urine or feces; a window was left at the wound, so that dressings could be changed. The plaster cast was made heavy and strong by embedding splints in it. The patient was returned to the ward. The man suffered very little pain, or inconvenience, except for 2 or 3 days, during which the dog was restless, and would attempt to move, and the more the dog would move, the more pain was inflicted not only on the patient but also on himself. He soon realized this, so that it was not necessary to give any morphin to the dog after the fourth day. The dog and man became very good friends. The patient's general condition gradually improved and his temperature and pulse remained about normal after the third day. To keep the dog tightly encased in the cast, it was necessary to pack cotton and gauze around him, as he lost considerable flesh. Five weeks later the man was again placed under medullary narcosis, and the dog under ether; the cast was removed, the skin and muscles were separated from the dog's leg, and the 2 bones divided near the joint, and placed in contact with the astragalus; the skin and deeper structures were united, except at the point of drainage, which slowly closed by granulation, but at the lower angle a fistula remained, through which a small fragment of one of the bones passed, which was broken at the time the dog was detached; this occurred 4 months later.

Stab Wounds of the Abdomen.—Bissel [1] reports 10 cases of penetrating stab wounds in the abdomen. He finds they frequently recover without operation. The wound and the fields near it should be thoroughly antiseptized and examination should be made with aseptic fingers, if at all, only to determine whether the wound penetrates the abdomen and whether injuries have been made to the internal organs. If doubt exists about the involvement of the organs, it is better to bring the divided edges of the peritoneum into the wound, fasten them there, drain and wait. If the viscera have certainly escaped damage, the wound should be closed by suturing the peritoneum. If the symptoms point to damage in the cavity, the wound must be enlarged and a complete exploration made.

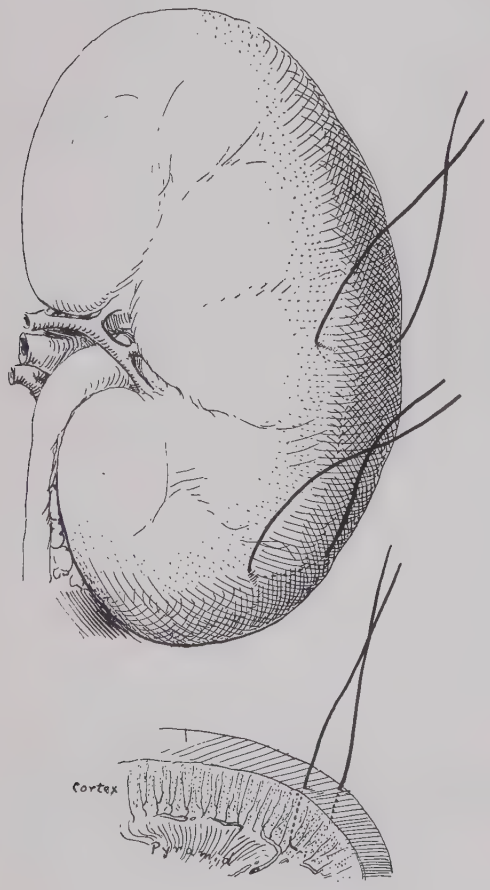
Exploratory Abdominal Section.—Owen [2] gives a history of two cases of chronic pancreatitis in which recovery followed exploratory abdominal section. He does not believe that drainage of the gall bladder is required as recommended by Robson.

A New Suture.—Max Brödel [3] describes a new stitch for friable

[1] Med. Rec., May 17, 1902, p. 763.
[2] Brit. Med. Jr., October 25, 1902, p. 1310.
[3] Amer. Med., August 2, 1902, p. 176.

organs, in which the direction of the suture is not parallel to the framework of the cortex, but at right angles to it. As the fibrous capsule is the most resistant structure, it is utilized instead of the kidney substance itself to furnish the main support for the suture. The suture is passed in a triangular manner through the cortex so as to leave 2

Fig. 21.

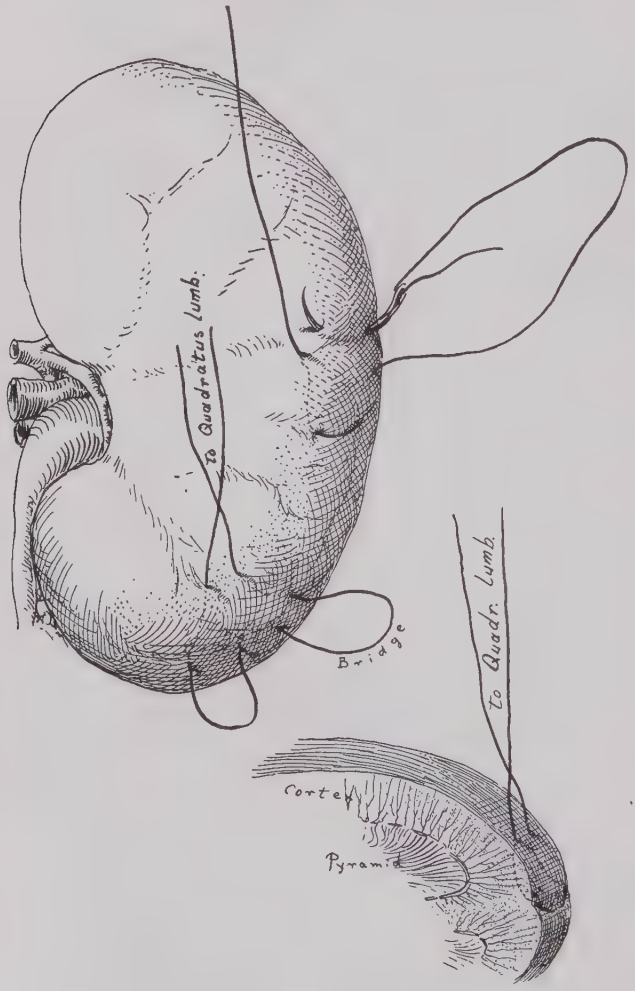


Old method of suturing kidney.

suture bridges on the surface of the kidney. These bridges bear the brunt of the work, and traction on the suture is borne by them instead of by the circulatory or secretory structures of the kidney. To make this suture tear, the bridge must pull the fibrous capsule into the cortical substance of the kidney, a procedure requiring considerable

force. Sutures placed in the old way, as in Fig. 21, tore out if a weight of 800 to 1000 grams was suspended from them. Sutures placed as in Fig. 22 will bear 3 times as much weight without tearing either

FIG. 22.

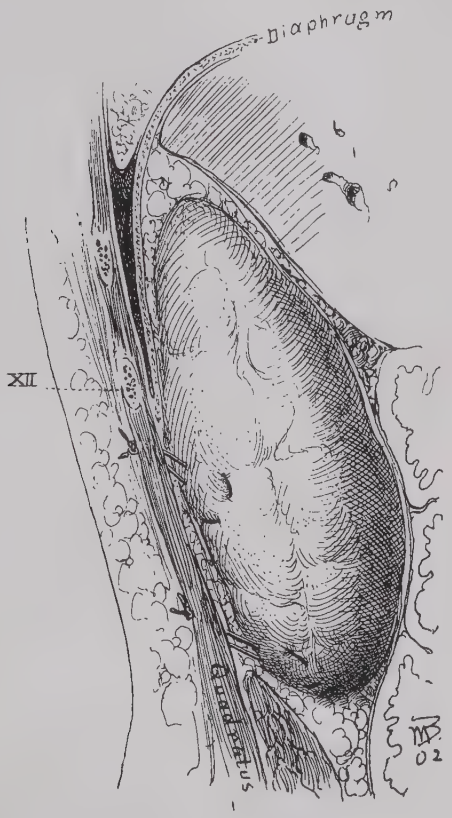


Brödel method of suturing kidney.

capsule or cortex, and support a force above that to which a kidney is subjected during life. The apex of the triangle should be on top and the bridges below (Fig. 23).

Rupture of the Liver.—Finkelstein [1] reports five cases of rupture of the liver with the mortality of but 40 per cent., and one of the deaths a case accompanied by other injuries to abdominal organs. The dangers from rupture of the liver are hemorrhage, infection, and loss of bile and its reabsorption. Care must be taken to stop the hemorrhage

Fig. 23.



Kidney anchored to abdominal wall by Brödel suture.

and cause the bile to flow externally. In 21 cases of cure collected from literature, tamponage was performed in 18, 3 sutured, 1 sutured and tamponed, 1 cauterized with hot water, and in 2 cases the hemorrhage had already ceased spontaneously.

Surgical Treatment of Ascites due to Cirrhosis of the Liver.—Brewer [2] states that the consensus of opinion is that in ascites

[1] Deutsche Ztschr. f. Chir., vol. lxiii, Nos. 3 and 4, 1902, p. 408.

[2] Med. News, February 8, 1902, p. 241.

due to cirrhosis the average case terminates in about eight weeks. He reports 5 cases operated upon by himself; 4 terminated fatally, all but 1 had marked evidence of nephritis; 1 died from uremia from ether, one from shock due probably to too long exposure on the operating table; the third from septic peritonitis probably due to faulty technique in managing the drainage; the fourth, the most unfavorable case, recovered without a bad symptom; the fifth died of general sepsis. The author reports in tabulated form 60 cases, showing that at least 6 were cured of ascites and remained well for two or more years. Six others were relieved for from two to six months. Another case with hemorrhage from the alimentary canal was promptly cured and a number of others materially improved. Thirty-eight recovered from the operation itself.

Lost Finger Tips restored by Sponge Education.—George E. Abbott[1] describes 2 cases in each of which, after the tip of the right index finger had been crushed off, he brought about an elongation of the stump to the extent of half an inch. The portion of nail left in the first case measured one-sixteenth of an inch only. Abbott commences treatment by sponge education leading the granulations on by means of the sponge graft, placing the sponge so that the granulations of the graft would grow onward and guiding those of the skin until it was time for them to bend round the points of the finger. The finger became half an inch longer than it would have been had it been allowed to heal in the usual manner, and a well-shaped nail was formed and there was no disfiguration. In the second case one-half inch of the finger had been crushed off. The entire nail and apparently all of the matrix were gone. When he saw the case two weeks after the accident a little callous ridge showed an attempt to develop the nail, the stump had completely healed except at the extremity where there was a mass of exuberant granulations. The same treatment was followed out, and the finger advanced fully half an inch. In this case, after etherizing, a straight incision was made from side to side through the stump. This gave one straight flap on the back of the finger from which the nail was to develop, if possible. The end of the stump was then incised into four triangular-shaped flaps which were dissected up so that they formed a crown around the stump except at the back. Into this crown was placed the sponge graft held in place by adhesive plaster and bandaged by gauze kept constantly wet with warm normal salt solution. The sponge kept in place was syringed every day with one part of hydrogen dioxid, one part of saturated solution of boric acid,

[1] Amer. Med., July 26, 1902, p. 139.

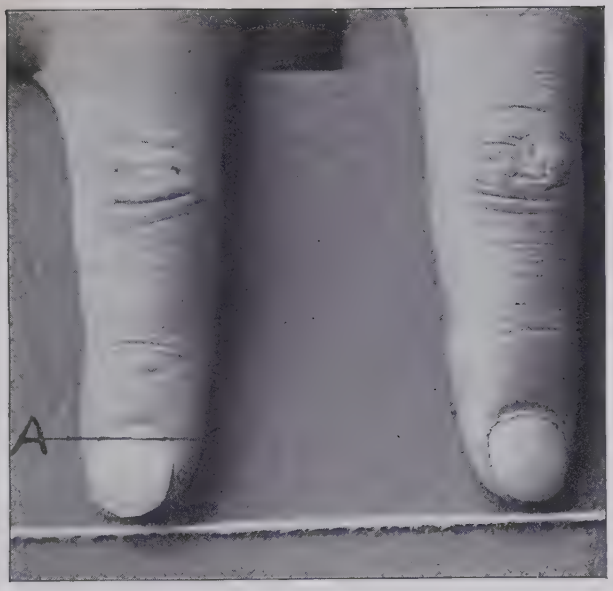


FIG. 24.—The tip of the right index-finger was crushed off and destroyed at the line *A*, and from that point has been reconstructed by sponge education, and led forward a half inch to its present length, being but one-sixteenth inch shorter than the left.

FIG. 25.—In this case the finger was cut off at *A*, and the tip led forward a half-inch, the treatment at this point being interrupted.

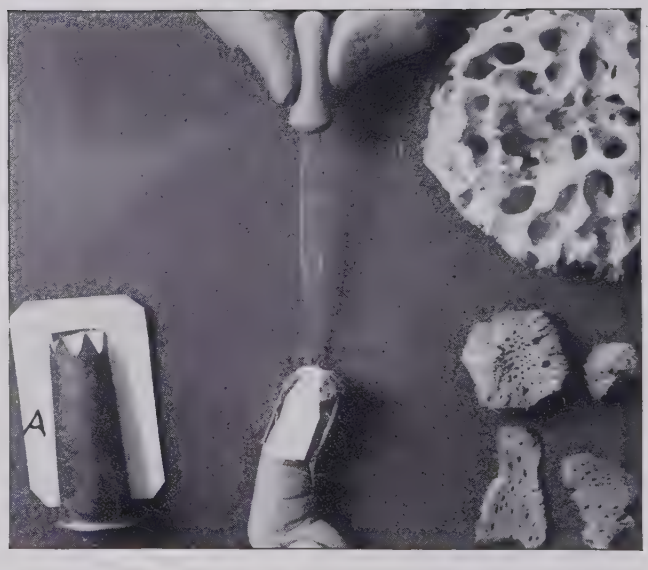


FIG. 26.—*A*, the end of the stump is incised into four triangular-shaped flaps, having their apices at the center of the nare-flap and their bases at the circumference of the stump. In the center the finger is represented when dressed, and in the act of being moistened with an antiseptic. To the right are various forms of sponge-grafts.

FIG. 27.—Congenital displacement of scapula.

FIG. 28.—Result obtained by exposure and suture of dislocation of acromial end of the clavicle.

and two parts of sterilized warm water. The plaster and old sponge were removed every three days. The sponge for this purpose must be fine-grained and stiff, and must be cut transversely to its fibers and cells (Figs. 24, 25, and 26).

Hernia.—Goldner [1] reports 804 Bassini operations on 473 patients for the radical cure of inguinal hernia, 423 being males. He allows two years at least for permanent recovery after the operation, and the patient must be able to work. Out of 466 cases after two years, recurrence was noticed in 35. Operation for recurrence was performed in 13 cases. Death occurred in but 3 patients, 1 of them being due to the anesthetic. The shortest stay in the hospital was 10 days, the longest 73 days. Thirty-two were younger than 5 years, and 16 over 50 years, the greatest number, 199, occurring between the ages of 20 and 30 years.

Lanz [2] makes a strong plea for doing away with taxis in strangulated hernia, as the practice is not only attended with danger to the bowel, but often prevents a radical operation from being performed. At that time it would be freer from adhesions than if left until later.

Club Foot.—Ogston,[3] in discussing club foot, describes in a well-illustrated article his own operation, which consists of dividing the enclosing layer of unossified cartilage of one or more of the tarsal bones. He enucleates by the Volkmann's spoon, and the bone will be restored by ossification of cartilage from the shell which remains. This makes the bone plastic so that it may be modelled into any required shape. If this is not enough, the cuboid and os calcis may be attacked. No joint is opened or injured, and the ligaments in other parts of the foot are not interfered with.

Malformations.—Joseph M. Spellissy [4] reports two cases of congenital misplacement of the scapula that he saw during one year. There was no history of traumatism (Fig. 27).

Dislocations.—James E. Moore [5] has satisfactorily treated a case of dislocation of the clavicle by cutting down upon the dislocated bone, returning it and the surrounding soft parts to their normal position, and fastening them there by means of silver wire and catgut sutures (Fig. 28).

An excellent account and skiagraph of a case of subacromial dislocation of the head of the humerus from muscular spasm is given by

[1] Arch. f. klin. Chir., No. 1, vol. lxviii, 1902, p. 1.
[2] München. med. Wchnschr., 1902, xlix, No. 5, p. 177.
[3] Brit. Med. Jr., June 21, 1902, p. 1524.
[4] Annals of Surg., May, 1902, p. 651.
[5] Ibid., May, 1902, p. 578.

Herman Mynter in the *Annals of Surgery,* July, 1902, p. 117 (Figs. 29 and 30). For 3 months before seeking treatment, the patient was under the impression that he was suffering from rheumatism of the shoulder.

Lymphangioma.—Charles N. Dowd[1] asked the opinion of the members present of the New York Surgical Society, as to the treatment of his case of lymphangioma of the face (Fig. 31). The repeated use of the cautery, with or without extirpation of both external carotids, seemed to be the mode of operation preferred. Wyeth had treated a case by injections of boiling water directly into the tumor.

Sarcoma.—Joseph S. Gibb[2] reports a case of marked deformity from the growth of a sarcoma in the nares and ethmoid cells (Fig. 32).

Chondromas.—R. Y. Ferguson[3] has operated on a case of multiple chondromas of the fingers of 35 years' standing, apparently originating in traumatism. Three of the fingers were disarticulated, and together weighed about 24 ounces, the largest one weighing 17½ ounces (Fig. 33).

Infective Arthritis.—Marsh in the Bradshaw lecture[4] leaves out of consideration the usual well-known causes of infective arthritis, as tuberculosis, syphilis, gonorrhea, and septicemia, and discusses those cases due to pneumonic infection, typhoid fever, dysentery, erysipelas, glanders, and acute rheumatism. The changes met with may be slight and transient, resulting from synovitis attended with infiltration by subsynovial tissue and with a limited amount of serous effusion in the joint cavity, or it may involve two or more joints which are painful from effusion. These are the deceptive cases resembling acute rheumatism. The fluid in the joint in some cases becomes purulent. In another group the inflammatory process involves the periarticular tissues and leads to considerable brawny swelling of the skin which becomes stretched and shiny. This is a common form in gonorrheal infection. There is no effusion into the joint cavity, suppuration very rarely occurring. The cases run devious courses and tend to result in a fibrous ankylosis, which gradually passes on to complete synostosis. Another group includes those which are acute and destructive from the first. There is early suppuration and rapid disorganization of the joint, and often a wide burrowing of pus. In the first form of a transient synovitis, the prognosis is favorable. It requires only a suitable splint and warm fomentations. When the joint cavities contain fluid, the fluid must be at once removed, and the joint freely irrigated either

[1] Annals of Surg., March, 1902, p. 407.
[2] Amer. Med., November 1, 1902, p. 707.
[3] Ibid., January 18, 1902, p. 96.
[4] Lancet, December 13, 1902, p. 1603.

FIG. 29.—Upward dislocation of the acromial end of the clavicle. (Before operation.)

FIG. 30.—Skiagraph of case of subacromial dislocation of the head of the humerus.

FIG. 31.—Lymphangioma of the face. The swelling was of firm texture, so that pressure from the fingers did not appreciably diminish its size. It seemed to involve all the tissues of the cheek, and there was no distinct line of demarcation between it and the surrounding tissue. It had been present since birth, but had been of small size until recently. During the last three years it had grown moderately, and during the last month it had grown rapidly. A piece excised for microscopical examination showed it to be a lymphangioma.

FIG. 32.—Sarcoma of the nares and ethmoid cells following repeated removal of nasal polypi.

FIG. 33.—Multiple chondromas in which amputation was done.

with carbolic lotion 1 in 100 or biniodide of mercury 1 in 1000. A full-sized hydrocele trocar and cannula may be used or the joint may be opened by incision at the side of the patella. If the fluid is purulent it must be opened more freely and any adhesions broken down and thorough irrigation carried out. It may forthwith undergo marked improvement and completely recover and retain free movement. In the plastic form, prognosis is unfavorable. A large amount of fibrous tissue is developed and the joint converted into a massive scar, so that ankylosis, first fibrous, then bony, results. As to treatment, the joint should be kept for the time being at complete rest; warm boric or opiate fomentations are required during the acute stage, but when swelling disappears a succession of small blisters will relieve pain and promote absorption. Massage will assist later. Should manipulation be employed in these cases to restore movement? In slighter cases this is advisable, but when there is severe or prolonged inflammation, the restoration of movement is impossible. Forcible manipulation is mischievous. In the last group, where the arthritis is from the first acute and destructive, prognosis is highly unfavorable, for there is general septicemia, and often there are grave lesions, and the case speedily is fatal. In rare cases general septicemia is of a milder type. If the joint is at once opened and irrigated, repair may take place, sometimes followed by considerable free movement.

Treatment of non-tuberculous joint disease by Bier's method had its origin in the well-known fact that pulmonary congestion from mitral disease is somewhat antagonistic to tuberculous processes in the lung. The peripheral portion of the limb is wrapped with two or three layers of bandage up to the affected joint. Above the joint the rubber bandage is applied firmly enough to cause a decidedly passive hyperæmia, avoiding excessive injurious pressure. A gauze bandage is first wrapped around the limb at the point of application of the rubber bandage. The treatment is kept up day and night for a number of weeks and months. The patient may go about. Bier was so satisfied with the treatment in tuberculous joint that he also extended the method to treat gonorrheal, rheumatic arthritis, and other forms of rheumatism.

Operation for the Cure of an Aneurism of the Ascending Portion of the Aorta.—Tuffier [1] recently reported a case of a woman upon whom he performed an operation for cure of an aneurism of the ascending part of the arch of the aorta. The dissection for the exposure of the tumor was easy. After expressing the contents of the sac, a

[1] Semaine méd., March 19, 1902, p. 92.

double ligature was placed about the neck of the sac, but the sac was not excised. The patient did well until the twelfth day, when a rise of temperature and gangrene of the sac was discovered. Had the sac been resected Tuffier believes that a cure would have resulted.

Tuberculous Cervical Adenitis.—In an interesting article on the surgical treatment of tuberculous cervical adenitis, James F. Mitchell [1] concludes, from the study of his own cases and their subsequent observation, and from the results of others, as follows: (1) Tuberculous cervical adenitis is primarily a local disease of very frequent occurrence, more often in young persons; in itself not extremely serious and rarely if ever proving fatal. (2) It bears, however, a certain definite relation to tuberculosis of the lungs and serves as the starting point from which tuberculosis may spread. (3) The tuberculin test as an aid to diagnosis is positive and harmless. (4) While recovery may often take place under good hygienic conditions, surgical interference is clearly demanded in most cases. (5) When surgical treatment is resorted to the operation should be radical in all cases. (6) Recovery may be predicted in 70-80 per cent. of cases so treated. Tuberculosis of the lungs after complete removal of the glands is comparatively rare. (7) Tuberculosis of the lungs unless far advanced is not a contradiction to operation, the removal of the glands apparently exerting a beneficial influence on the condition of the lungs (Figs. 34 to 42, inclusive).

New Trephine.—John Chalmers Da Costa [2] describes a new trephine, devised by T. C. Stellwagen, Jr., for osteoplastic resection of the skull. The instrument cuts the flap with a minimum expenditure of time and without inflicting any serious concussion upon the intracranial structures. Fig. 43 shows the method of using the trephine, which makes an osteoplastic flap or cuts out a circular piece of bone.

Choledochotomy in Cholelithiasis.—A. W. Mayo Robinson [3] gives as his experience from operating on several hundred cases of cholelithiasis that he has found the common bile duct involved in one out of every five or six cases. In ten cases he was able to manipulate the concretion back into the gall bladder and then extract it with a scoop. In patients too old or ill, cholecystotomy may be performed, which relieves jaundice and renders possible the use of solvent injections. Friable stones in the common duct have been crushed by the operator's finger and thumb in some 30 instances. This procedure is no longer used by him. Robinson has abandoned the operation of

[1] Johns Hopkins Hosp. Bull., July, 1902, p. 161.
[2] Annals of Surg., July, 1902, p. 76.
[3] Lancet, April 12, 1902, p. 1023.

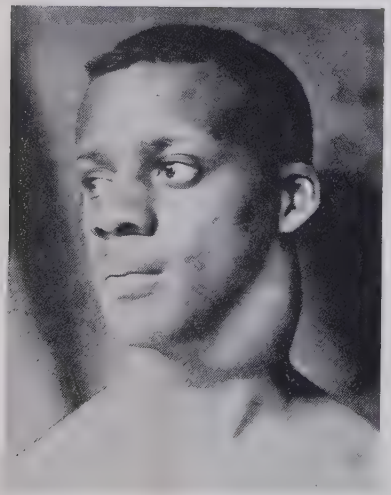
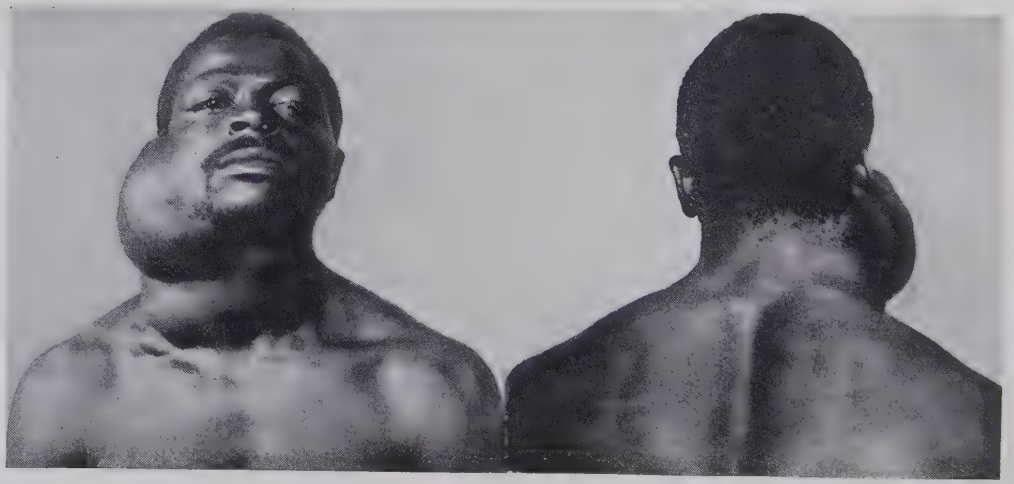


FIG. 34.—Characteristic tumor formed by tuberculous glands of neck.



FIGS. 35 and 36.—Hodgkin's disease forming large tumor in neck. (Anterior and posterior view.)

FIG. 37.—Keloidal scar and area of anesthesia following complete excision of glands of neck.

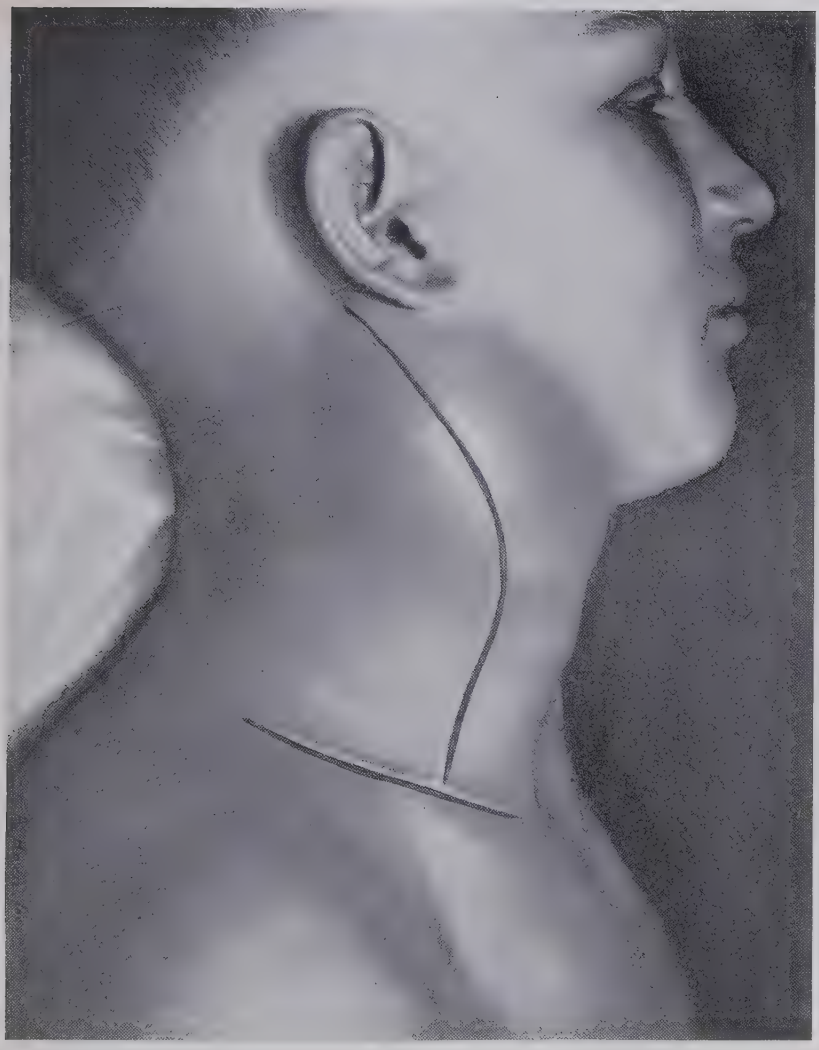


FIG. 38.—Skin incision for complete removal of glands of neck.

FIG. 39.—Skin flaps reflected, showing quadrilateral exposure of all parts of the neck obtained through the T-shaped skin incision.

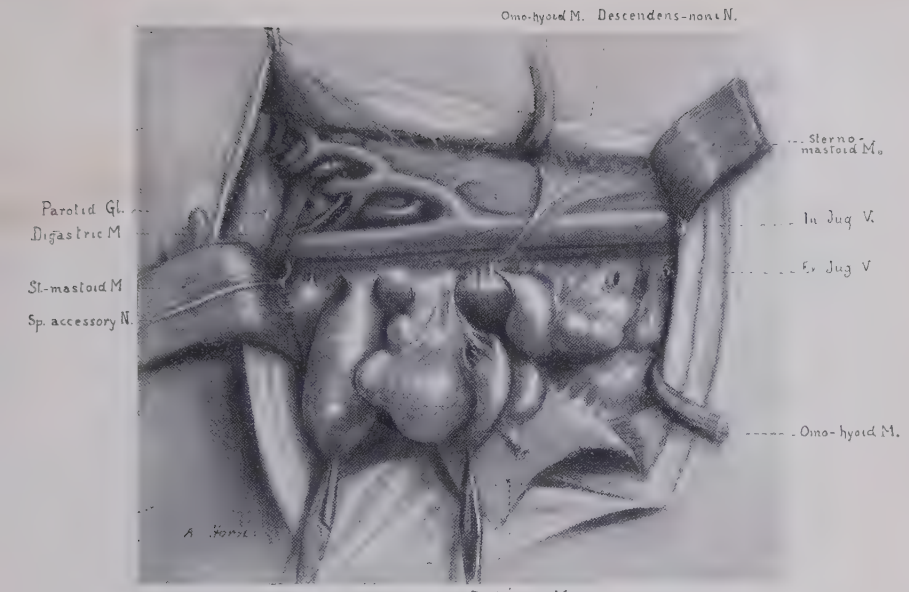


FIG. 40.—Glands dissected away from internal jugular vein.

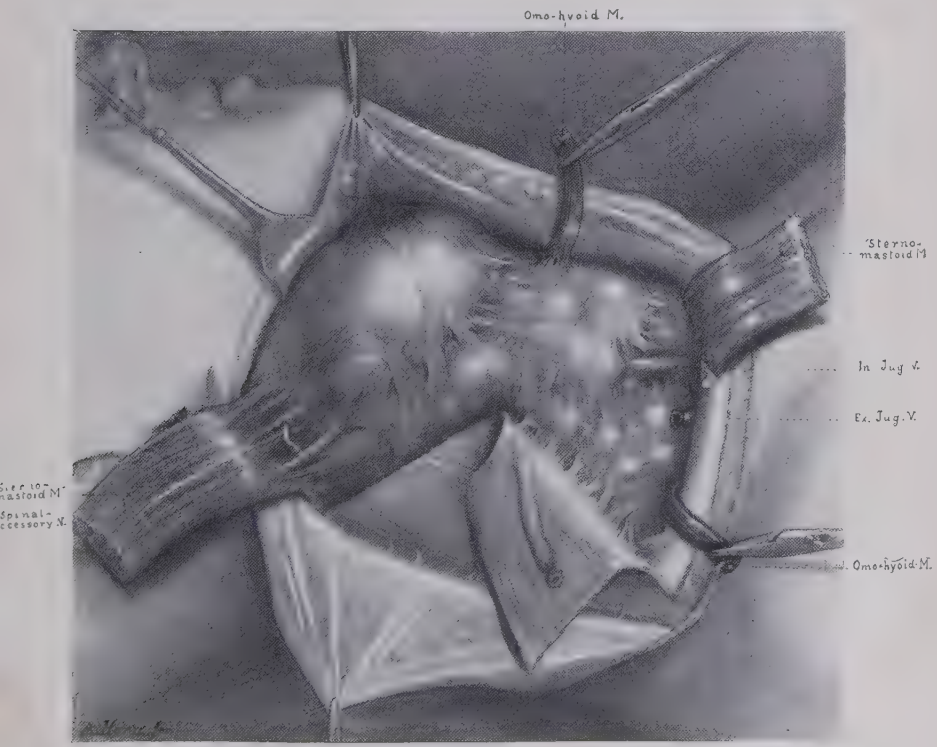


FIG. 41.—Omohyoid and sternomastoid muscles divided and reflected; external jugular vein ligated and divided.

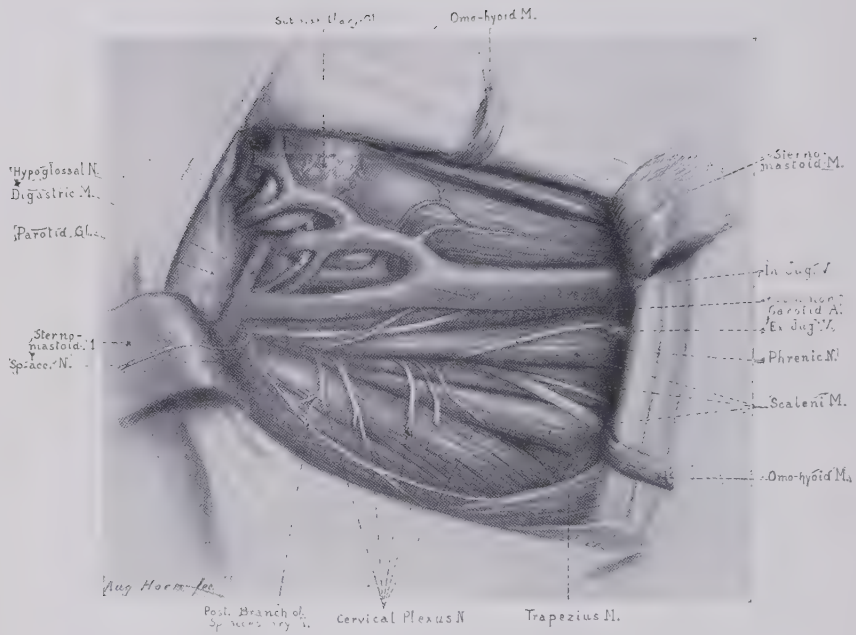


FIG. 42.—After complete removal of glands. Spinal accessory nerve intact, its posterior branch given off before entering sternomastoid muscle showing its anastomosis with cervical plexus.

FIG. 43.—STELLWAGEN TREPHINE.—It will be observed that the index-finger is hooked beneath the finger-guard on the bar, and not extended along the shaft of the instrument, which is the method employed in using the ordinary trephine. The manner of holding this instrument should be most particularly observed, as the success of the manipulation largely depends upon absolutely controlling, at the same time, the saw and the centre pin. By holding it correctly the greatest amount of power is obtained with the least resistance and the slightest pressure; thus the control and power of the instrument are much increased.

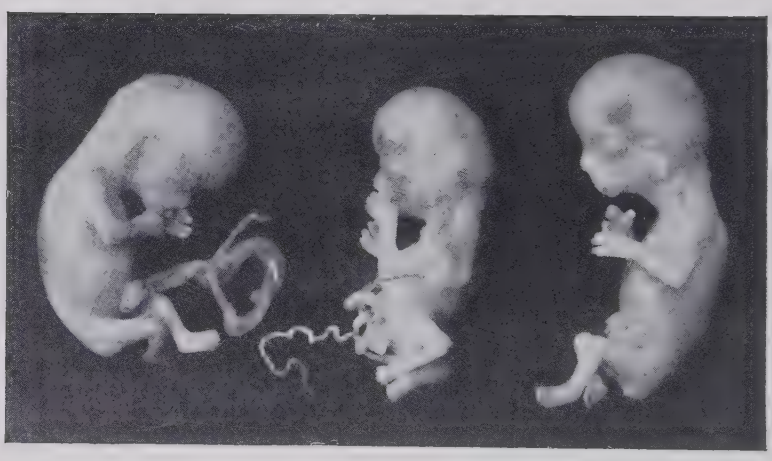


FIG. 46.—Left triple ectopic gestation.

cholecystenterostomy, or short-circuiting the obstruction, as it does not remove the cause and the opening is apt to contract and the trouble recur. A union between the gall bladder and colon is easier than choledochotomy when the patient is very ill, but it is only applicable when the gall bladder is distended, an unusual condition in cholelithiasis. He has performed the McBurney operation, reaching the common duct through the opening of the duodenum 11 times, with 3 fatalities. In the performance of this operation there is considerable danger of infection, and the operation is no longer recommended. Robinson considers the ideal operation to be that of choledochotomy, and reports 68 cases operated upon with a mortality of but 5.5 per cent., the last 21 cases having all recovered.

Hemorrhage from the Tonsil.—Stewart [1] describes a fatal case of hemorrhage from the operation of removal of the tonsil in a hemophilic child, while Escat [2] reports recovery by operation in a severe case where gargling with cold water, tamponing, using the galvanic cautery, ice, and hæmostatics failed. Records's compressor arrested it, but the pain was so great that it had to be removed. The method of Baum was then tried with success. With a needle holder used in staphylorrhaphy he passed a large curved needle and silk thread through the anterior and posterior pillars of the fauces with one movement and tied the suture. This not being sufficient, he passed another two cubic centimeters below. The cavity left by removal of the tonsil was closed, but the hemorrhage continued. Gelatin was injected into the cavity without result. A cylindrical tampon of cotton roll of the size of his little finger was then carried by a nasopharyngeal forceps from above the upper suture into the cavity and downward until it appeared below the lower suture. The hemorrhage was stopped at the end of 24 hours, sutures and tampon removed. The cotton may be previously moistened with adrenalin, 1 to 5000, hydrogen peroxid, antipyrin (10 per cent.), or ferropyrin (2 per cent.).

Exsanguinated Uterine Zones.—Byron Robinson [3] describes the bloodless zones of the uterus, territories supplied almost entirely by capillaries. This area if incised while the uterus is in a resting state does not cause fatal hemorrhage. There are four of these zones, (1) the bilateral exsanguinated cervical zone, (2) the central longitudinal exsanguinated uterine zone, (3) the fundal exsanguinated uterine zone, and (4) the cervicocorporal exsanguinated zone. These zones are of

[1] Lancet, November 15, 1902, p. 1321.
[2] Presse méd., August 30, 1902, p. 835.
[3] Phila. Med. Jr., November 1, 1902, p. 644.

especial importance as indicating localities for appropriate surgical intervention (Figs. 44 and 45).

Ureter and Urethra.—H. A. Kelly[1] diagnoses stricture of the

Fig. 44.

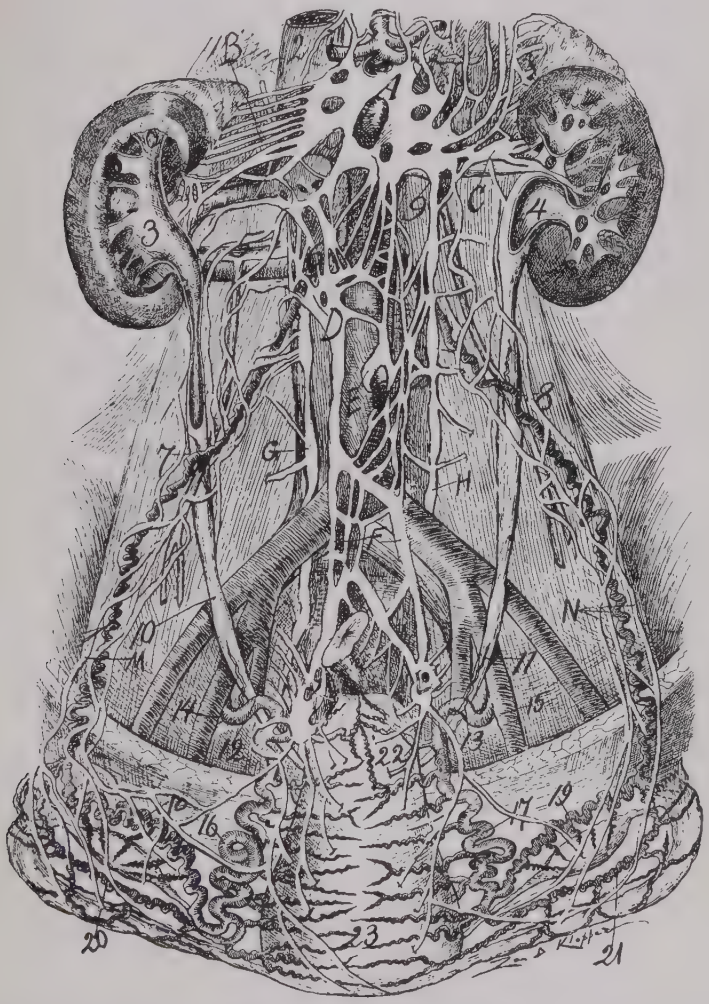
The Utero-Ovarian Vascular Circle.—Drawn from X-ray of infant one day old, the arteries and ureters being previously injected with red lead and starch. Demonstrating the longitudinal exsanguinated uterine zone (A, B, C). Also the lateral cervical and fundal exsanguinated uterine zones. The spiral segment of the genital vascular circle, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12. The straight segment, abdominal aorta, common iliac, and internal iliac. The renal vessels in this cut present a dorsal view; 46, 46, supplies two-fifths of the dorsal segment of the kidney; 47, 47, supplies three-fifths of the kidney, the ventral half and part of the dorsal half. The genitals and spiral segment of the utero-ovarian vascular circle present a ventral view, but are drawn from a dorsal X-ray view.

ureter by the passage of the urethral sound. It is a true diminution of the caliber of the ureter from changes in its walls, and may be congenital, inflammatory, or neoplastic. Only the inflammatory strictures are

[1] Jr. Am. Med. Asso., August 16, 1902, p. 363.

capable of relief. The tuberculous form is commonest, the gonorrheal most rare. Only an expert can recognize this condition. The commonest site according to Kelly is at the vesical extremity of the organ. The

FIG. 45.



Represents the exsanguinated circle with sympathetic nerve, with course of ureters and central longitudinal exsanguinated uterine zone (23) of a subject pregnant about three months. Uterus is drawn distalward in order to expose its dorsal surface. The letters and figures refer to well-known anatomical landmarks.

treatment consists in overcoming the infection, removing the cause, and in dilating the ureter to its normal caliber by the passage of the ureteral sound.

Lydston [1] discusses the relation of the caliber of the urethra and especially of the meatus to vesical tone. He believes that the normal vesical tone depends upon a certain degree of physiologic obstruction to the urinary outflow. Upon the same resistance the structural and functional integrity of the bladder walls depend. This resistance is greatest at the meatus. An exaggeration of this resistance produces bladder atony in old subjects, hypertrophy and exaggerated power in the young. A diminution of this resistance such as follows urethrotomy, and especially meatotomy, produces more or less vesical atony, so that in certain cases the resistance of the meatus should be carefully preserved.

Gross [2] reports a case showing the value of ureteral catheterization by which he obtained facts to justify the diagnosis of pyelitis of the right kidney, and to institute treatment by irrigation into the pelvis of the kidney. With 10 grams of the 1 to 1000 silver nitrate solution, 10 irrigations were made at intervals of 4 days. The result was complete recovery. He considers its value as very great in diagnosis and also as a therapeutic factor in many affections of the kidney, and that there is little or no danger of infection, if care is used to disinfect instruments and irrigate the bladder and urethra.

Anesthetics.—The *Lancet,* March 29, 1902, p. 911, notices an article by Dr. Scott, of Cleveland, on the question of the possibility of producing chloroform anesthesia during sleep. This writer considers such a feat with ether to be impossible, but with chloroform it can be accomplished. He has succeeded with young children and with one adult who greatly dreaded an operation for tuberculous arthritis. Finding her asleep on his arrival, chloroform was given very carefully and slowly. The stage of excitement was momentary and the operation was successfully performed under the anesthetic.

Embley [3] states that air-chloroform to a greater extent than two per cent. should not be used for anesthetic purposes, and that at the beginning even a less percentage than this would be safer. The respiration should be watched by the anesthetist, as it is an index of the condition of the circulation, since after the primary period respiration only fails owing to a fall in blood pressure. While the actual cutting of the vagus in dogs narcotized with chloroform causes a resumption of heart activity, re-establishment of the circulation, and consequent return of respiration, this means cannot be employed in men. Fortunately, we have in atropin a drug which quickly paralyzes the vagus and answers the same purpose as severing the pneumogastric nerve. As atropinized

[1] Amer. Med., June 21, 1902, p. 1068.
[2] N. Y. Med. Jr., September 13, 1902, p. 441.
[3] Brit. Med. Jr., vol. i, 1902, pp. 817, 885, 951, and 975.

dogs never suffer cardiac arrest from vagus inhibition, this drug should always be given previously to the employment of the chloroform and in larger amount should danger from the narcotic arise during anesthesia.

Korff [1] reports an additional series of 130 cases operated upon without any disagreeable results with scopalamin and morphin as the narcotics. Four hours before the operation 0.01 gram of morphin and 0.0012 gram of scopalamin are injected; two hours later a second injection is made, and half an hour before the operation a third injection. As paralysis of the tongue may occur, care must be taken not to allow this structure to impede the free passage of air. Some weakness of the heart was observed in one very debilitated case after the first injection, though the patient subsequently supported the other two injections without trouble.

Rhythmical Compression of the Heart in Resuscitating those in Syncope due to Anesthetics and any other Conditions. —At the last meeting of the Society of Anesthetists, A. E. Starling [2] reported a case in which during the trimming of the stump of the appendix both pulse and respiration stopped at the same time. Artificial respiration and contraction of the tongue were performed without success. Then W. A. Lane introduced his hand into the abdominal incision and felt the motionless heart through the diaphragm. He gave a squeeze or two and felt it restart beating, though no radial pulse was discernible. As respiration was still suspended, artificial respiration and other restorative measures were adopted. Respiration recommenced in about 12 minutes and the pulse became perceptible. In this case the diaphragm was not incised as recommended by Mauclaire, but the heart was compressed through the diaphragm.

Miscellaneous Topics.—Smith [3] describes Gersuny's method of subcutaneous injections of paraffin.[4] The paraffin is sterilized before using. With a forcible aspirating syringe and needle he draws up the paraffin, expels the air, and submerges the syringe in water of 130° F. This keeps the paraffin in liquid form. Five minims of a four per cent. solution of cocain is injected previous to the paraffin. The injection is made slowly, using the thumb and index finger of the left hand to mould the paraffin as demanded by the peculiarity of the deformity. The paraffin remains plastic about one-half a minute before solidifying.

Morris [5] reports the result of a number of experiments made with

[1] München. med. Wchnschr., July 8, 1902, p. 1133.

[2] Lancet, November 29, 1902, p. 1476.

[3] N. Y. Med. Jr., May 17, 1902, p. 837.

[4] For additional data, see report by Romme in vol. ii of last year's Clinics, p. 8.

[5] Med. Rec., May 17, 1902, p. 773.

thick sterilized animal membrane from the peritoneum of an ox sent to him by Cargile, of Arkansas. The membrane resists absorption in the peritoneal cavity for more than 10 days, but less than 30 days. Its presence causes the formation of temporary loose adhesions which are harmless, and which become absorbed for the most part in less than 30 days. It causes little disturbance to the peritoneum. It does not furnish a good culture medium and it protects areas of injured peritoneal surface until new endothelial cells have repaired the injury without involving the neighboring peritoneum. The membrane becomes instantly adherent to moist surfaces without suturing and is not readily dislodged.

Arthur Booth,[1] in an article on the radical cure of exophthalmic goiter, concludes that cases may be completely cured both by thyroidectomy and bilateral section of the sympathetic, while from the fact that some cases are cured by external medication there must be a certain proportion in which the affection does not induce the structural change of any organ. Three factors must be considered in the production of the disease—the central nervous system, the connecting fibres (sympathetic and vagus), and the thyroid gland. A lesion of one of these parts may produce alterations of the others; the consequence of which may give rise to symptoms known as Graves's disease.

Camescasse [2] reports having treated 30 cases of malignant fistula by a free incision and then bathing slowly with several drams of hydrogen peroxid, and afterward applying sodium bicarbonate. This is followed by rapid improvement in the local and general condition of the patient.

Munson,[3] discussing the treatment of burns, says never use a dry dressing, never forcibly remove the skin or deeper tissue, never use any oils or salves, and never change dressings too frequently. He applies at once an antiseptic liquid dressing, and keeps his patient as comfortable as circumstances will permit.

The *Scientific American,* June 26, 1902, publishes an illustrated paper on Laborde's electric apparatus for keeping up tongue traction in persons who have been asphyxiated or drowned. Even in apparently hopeless cases resuscitation may occur. Dogs have been revived after two or three hours of apparent death.

Krusen [4] reports an interesting case of triple ectopic gestation (Fig. 46).

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[1] Jr. Nerv. and Ment. Dis., September, 1902, p. 513.
[2] Bull. gén. de thérap., vol. cxlii, No. 5, 1902, p. 186.
[3] Med. News, July 26, 1902, p. 157.
[4] Amer. Med., January 4, 1902, p. 18.

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